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# LIFE ADJUSTMENT IN ADOLESCENTS WITH INSULIN-DEPENDENT DIABETES MELLITUS

by

ANNE ELIZABETH CARTEN

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE

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A E Carten
(Student's signature)

870 Monk St.,
Moose Jaw, Saskatchewan.
Canada. S6H 5B6

(Student's permanent address)

Date: October 1, 1990

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FACULTY OF GRADUATE STUDIES AND RESEARCH

The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies and Research, for acceptance, a thesis titled LIFE ADJUSTMENT OF ADOLESCENTS WITH INSULIN-DEPENDENT DIABETES MELLITUS submitted by ANNE ELIZABETH CARTEN in partial fulfillment of the requirements for the degree of MASTER OF NURSING.

Janet Kerr

Janet Kerr (Supervisor)

Ruth Elliott

Ruth Elliott

S. Hunka

Steve Hunka

Date: October 5, 1990.

**Abstract**

This study was conducted to explore the relationship between self-esteem, depression and adjustment to diabetes in adolescents with insulin-dependent diabetes mellitus. As well, the effects of gender, age of the adolescent at onset of diabetes and the number of years since diagnosis, on life adjustment was explored. Data were collected using the Children's Depression Inventory, Coopersmith Self-Esteem Inventory and Diabetic Adjustment Scale. The study sample consisted of 27 females and 26 males with an age range from 13 to 17 years. The mean age of the sample was 15.2 years, the mean age at onset of diabetes was 8.5 years and the mean years since diagnosis of diabetes was 6.7 years.

As a group, the adolescents demonstrated a healthy adjustment to diabetes and to life in general. Measures of self-esteem, depression and diabetic adjustment were significantly correlated. Adolescents who were well-adjusted to diabetes had higher levels of self-esteem and lower levels of depression than adolescents who were poorly adjusted to diabetes. There were several findings in this study that had implications for nursing practise and research. Females experienced higher levels of depression and expressed a more negative attitude toward diabetes than males. As well, adolescents diagnosed with diabetes during puberty had higher levels of depression than adolescents

diagnosed during childhood. However, there were no significant group differences related to the length of time since diagnosis of diabetes.

Further research should focus on possible gender differences in life adjustment and the effects of onset of diabetes during puberty on coping behaviors, compliance and adjustment factors. Finally, a longitudinal approach where adolescents are studied from onset of puberty to early adulthood may demonstrate the effects of cognitive, emotional and physical maturation on the life adjustment of adolescents with diabetes.

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# 1. Introduction

## Statement of the Problem

Insulin-dependent diabetes mellitus is a life-long chronic illness that presents a formidable coping challenge for the adolescent. The hormonal and physical changes that occur during adolescence may adversely affect glycemic control (Younger et al., 1985). As well, the life-threatening aspects of the disease, demands for lifestyle modifications, threats to personal control and body image and complex treatment requirements interfere with most of the goals of normal adolescence (Bennett-Johnson, & Rosenbloom, 1982; Brink, 1987; Surivet, Feinglos, & Scovern, 1983). Yet with reasonable adjustment to the demands of diabetes management, adolescents can expect to lead rewarding and productive lives.

Management of diabetes is a complex task which requires that the adolescent recognize the interaction between diet, exercise, emotions and insulin dose. One of the biggest challenges facing parents, physicians and diabetes educators is that of supporting the adolescent in the drive for independence yet ensuring that good glycemic control is obtained through adherence to the diabetic regimen. Until the advent of formal operational thinking and abstract thought, the young adolescent may lack the cognitive maturation to manage the disease in an operational day-to-day sense. As well, the inability to project into the future

makes the fear of long-term complications irrelevant as a possible motivating factor for achieving good control (Ingersoll, Donald, Alison, & Golden, 1986).

The possibility that there are relationships among psychologic adjustment, coping and illness factors has attracted particular attention from diabetologists. Concerns have been expressed that young persons who fail to come to terms with diabetes may develop depression, poor self-esteem, excessive anxiety or guilt. Existing emotional difficulties, on the other hand, have been thought to be just as likely to undermine successful coping. In turn, both psychologic and coping processes have been presumed to be vulnerable to medical factors, such as illness severity and quality of medical control (Felton & Revenson, 1984; Johnson, 1980).

In the research it has also been emphasized that the emotional well-being and the adjustment of diabetic youngsters must be viewed within the context of their social milieu. The parents' reaction to diabetes, the adjustment of mothers (who carry much of the responsibility for their children's care) and aspects of family life have been highlighted as salient factors (Fisher, Delamater, Bertelson, & Kertily, 1982). However questions still remain about the extent to which these variables are causally related to each other (Delamater, Kurtz, Bubb, White, & Santiago, 1987; Johnson, 1980).

Each adolescent presents unique and individual challenges to the health professional responsible for his or her care. The medical management regimen has a major impact on the adjustment to diabetes and the nature of the clinical course of diabetes necessitates coordination among health care services. Therefore, it is important for health-care teams and diabetes educators to be aware of factors that affect adolescent adjustment to diabetes in order to develop effective intervention strategies which maximize the adolescent's physical and mental health.

**Diabetes Mellitus as a Chronic Illness**

Diabetes mellitus is a major chronic health problem which affects an estimated one-half million Canadians. Insulin-dependent diabetes mellitus is the most common endocrine disorder of childhood and approximately 150,000 children and adolescents are entirely dependent on daily injections of insulin for survival. These children represent approximately 5% of all cases of diabetes (Younger et al., 1985). Diabetes can be described as a heterogenous group of complex illnesses which is characterized by chronic hyperglycemia. Diabetes produces neuropathy and retinopathy and increases the risk for developing heart and kidney disease, blindness and infection leading to gangrene (Herman et al.,1984; Knowler, Everhart, & Bennett, 1985). These

complications account for most of the morbidity and mortality associated with diabetes mellitus.

There are two major types of diabetes, each associated with different incidence, prevalence, complications and mortality rates; each having different risk factors and implications for prevention. Type I or insulin-dependent diabetes mellitus (IDDM) is defined on the basis of a need for exogenous insulin to maintain normal metabolic homeostasis and in the case of children, to support normal growth and development. Almost all diabetic children under the age of 16 have insulin-dependent diabetes mellitus (Genuth, 1983). Epidemiologic studies conducted in Canada and the United States have shown an annual incidence of diabetes in children that ranges from 6 to 12.1 cases per 100,000 (Colle & Siemiatycki, 1985; Hamman et al., 1990; La Porte et al., 1981).

In Type II or non-insulin-dependent diabetes mellitus the basic physiologic problem involves insulin resistance and inappropriate insulin secretion. People with non-insulin-dependent diabetes produce endogenous insulin, do not have pancreatic islet cell antibodies and do not require exogenous insulin for survival. Management usually entails oral hypoglycemic medications, weight reduction or controlled diet and fewer systemic complications develop. In Europe and North America, approximately 90% of diabetics have non-insulin-dependent diabetes (Knowler et al., 1985).

The etiology of insulin-dependent diabetes mellitus is multifactoral and is believed to result from the interaction of genetic and environmental factors mediated by an autoimmune process which leads to destruction of the insulin-producing Beta cells. Recent epidemiologic studies of insulin-dependent diabetes mellitus have demonstrated a strong genetic susceptibility among Human Leukocyte Antigen (HLA) -identical siblings, and identified a long latent period between the time islet cell damage can be detected and the appearance of symptomatic disease (Bennett, 1985; Colle & Siemiatycki, 1985). Environmental factors such as mumps and coxsackie viral infections and toxins are implicated in the development of insulin-dependent diabetes mellitus by either directly destroying the Beta cells or by triggering the autoimmune process in a genetically predisposed person (Noto, 1987).

**Clinical Course**

Children and adolescents usually present with a rapid onset of the classic features of insulin-dependent diabetes mellitus: polyuria, polydipsia, fatigue and weight loss. Blood glucose levels are generally markedly elevated and ketosis or ketoacidosis with coma may occur before the diagnosis of insulin-dependent diabetes mellitus is established. Other symptoms of hyperglycemia include irritability, blurred vision, abdominal pain and leg cramps (Noto, 1987; Younger et al., 1985).

After an initial diagnosis has been made, from one-third to one-half of all children will enter a "honeymoon" phase during which time pancreatic function improves and a marked lessening of the clinical and biochemical expression of the condition will occur. Variable secretion of endogenous insulin may allow the newly diagnosed diabetic to maintain blood glucose values within the normal range and insulin dosage will need to be decreased to prevent hyperglycemia. The child may remain in excellent control despite relatively poor dietary compliance (Younger et al., 1985).

Subsequent deterioration in pancreatic insulin secretion leads to a total diabetic state which is characterized by rapid onset of ketosis if insulin is omitted, increasing episodes of nighttime to early morning hypoglycemia and an increase in insulin requirements. Management of diabetes becomes more difficult due to dietary restrictions and the need for multiple insulin injections to stabilize blood glucose (Younger et al., 1985).

**Treatment Requirements**

The treatment program for insulin-dependent diabetes mellitus consists of insulin injections, diet modification, exercise and general health maintenance measures. The primary goal of treatment is to assure normal growth and development. Diabetes care must be adjusted to the child's development and ever changing level of responsibility and

attention must be given to the educational, psychologic and emotional needs of the entire family (Holmes, 1985).

After the diagnosis of insulin-dependent diabetes mellitus is made, the child or adolescent is initially hospitalized to stabilize blood glucose levels and to educate the family and patient about the pathophysiology of diabetes, insulin action, diet and mealtime planning as well as the causes, symptoms and treatment of hypoglycemia and hyperglycemia. Insulin administration and blood and urine glucose and ketone testing must be mastered, with the major responsibility for enforcement of the diabetic regimen shouldered by the parents. As the child matures and gains skill and confidence, management tasks are taken over and by mid-adolescence the teen is expected to assume the life-long commitment to daily diabetes management with minimal parental supervision (Noto, 1987).

Successful management of diabetes is enhanced by outpatient follow-up, utilization of home glucose monitoring, measurement of glycosylated hemoglobin and recognition of psychological deterioration in the adjustment to diabetes. The child or adolescent and parents are taught to adjust the insulin dose in relation to exercise, meal size, blood glucose level and episodes of illness. Few diseases demand such a high level of comprehension and technical competence. Denial of diabetes, poor compliance, guilt and overprotectiveness by parents, depression and a negative attitude toward diabetic management are signs of

difficulty in adjustment. Diabetic support groups, family and individual counselling and attendance at diabetic camps are useful for enhancing peer interaction, providing role models, fostering independence in diabetic management and reinforcing diabetes education (Sperling, 1987; Younger et al., 1985).

**Complications**

Poor metabolic control in the child or adolescent has been associated with growth retardation and delayed pubertal development, hypoglycemia and neuropsychological impairments, and hyperglycemia and diabetic ketoacidosis. Children with insulin-dépendent diabetes mellitus can demonstrate modest growth failure, in part due to growth hormone resistance. Genetic, nutritional and psychologic factors as well as overall metabolic impairment of the diabetic state have been implicated (Amiel, Shermin, & Hintz, 1984). In a study of 65 children with significant decrease in linear growth velocity, unsuccessful diabetic management was implicated as the contributing factor. The familial psychosocial environment was inadequate and there was a tendency for recurrent bouts of ketoacidosis, overinsulinization, lack of compliance with dietary plans and neglect of home monitoring (Rudolf, Sherwin, & Markowitz, 1982). Tattersall and Pyke (1973), using comparison data from twins, concluded that difficulty in the management of diabetes was the most likely reason for growth impairment and pubertal delay. Girls in whom onset of

diabetes was prepubertal may experience some delay in menarche. Variables influencing extreme delay in sexual maturation are a long duration of diabetes, early age at onset of diabetes and erratic patterns of glycemic control (Younger et al., 1985).

Although neuropathy, proteinuria, necrobiosis, retinopathy and hypertension occur in less than 15% of children, the impact of early diagnosis and treatment on limiting complications makes screening of great importance (Younger et al.,1985). Thyroid dysfunction, lipohypertrophic changes and limited joint mobility are more frequently found in diabetic children and adolescents. Limited joint mobility is associated with short stature, delayed sexual maturation and microvascular complications such as retinopathy and neuropathy (Rosenbloom, 1984). Lipoatrophy at injection sites, although physically harmless, is of cosmetic concern to children and adolescents, especially girls. Hypertrophy of subcutaneous tissues arises from over-utilization of "favorite" injection sites. Rotation of injection sites and injection of highly purified insulin can reduce the presence of embarrassing "lumps and bumps".

Hypoglycemia is one of the most anxiety-producing complications of diabetes, primarily because of potential embarrassment if witnessed by peers. Irritability, anxiousness, tremulousness, headache, tachycardia, drowsiness, dilated pupils, seizures or even coma can occur as a result of hypoglycemia. Missed meals, strenuous

exercise, excess insulin intake, insulin dosage error or irregular peak effects of insulin can precipitate hypoglycemia. Some children experience recurrent night sweats and bad dreams or seizures and coma during the early morning hours. The Somogyi phenomenon, a hyperglycemic surge which occurs as a result of counterregulatory hormones that increase glucose production after hypoglycemia, masks these nighttime hypoglycemic episodes (Sperling, 1987). Over the past ten years, research has suggested that labile blood glucose levels characteristic of insulin-dependent diabetes mellitus are associated with cognitive and neuropsychological impairments (Ryan, Vega, Longstreet & Drash, 1984). Seizures or other neurologic signs may be seen in up to 38% of children and adolescents (Eeg-Olofsson, 1979). Electroencephalograph (EEG) abnormalities have been reported in 25% of children with insulin-dependent diabetes mellitus as compared with 10 to 15% of a control population. The highest frequency of these EEG abnormalities occurred in children who had five or more reported episodes of hypoglycemia with loss of consciousness and seizures (Hautmont, Corchy, & Pelc, 1979).

Four insulin counterregulatory hormones--glucagon, catecholamine, cortisol and growth hormone, oppose the effects of insulin. Their secretion is stimulated by stress, and in their presence, insulin requirements are increased. Glucagon is secreted from pancreatic alpha cells and causes increased glucose production through activation of

glycogenesis and gluconeogenesis. Epinephrine and norepinephrine release is stimulated by activation of the sympathetic nervous system by physical or emotional stress, acidosis or fever. These hormones increase blood glucose and free fatty acid concentration. A sustained release in growth hormone levels, which may occur during prolonged periods of stress, accelerates hepatic glucose production and leads to increased free fatty acid levels (Krane, 1987). Acute hyperglycemia and ketosis are usually related to current illness, poor compliance and/or emotional upsets. Ketoacidosis severe enough to require hospitalization is usually preventable. One or more of the following problems are usually implicated in the development of ketoacidosis: failure to take the prescribed insulin dose or to adjust the insulin dose for growth and level of physical activity; inappropriate home management of intercurrent illnesses; and severe physical or emotional stress which stimulates counterregulatory hormones, alters liver metabolism and results in marked hyperglycemia and ketosis (Younger et al., 1985). In the development of diabetic ketoacidosis, a lack of endogenous insulin to overcome the antagonistic actions of the counterregulatory hormones creates a superfasted state with the body's tissues deprived of their normal energy substrate--glucose.

Serious microvascular complications are associated with diabetes including retinopathy, neuropathy, and kidney failure. The causal relationship between hyperglycemia and

chronic complications has been disputed for many years but the research evidence from animal models and controlled clinical studies is highly suggestive that hyperglycemia is a major determinant of the chronic complications of diabetes (Knowler et al., 1985; Kostraba et al., 1989; Younger et al., 1985; Zimmerman, 1989). These complications are generally manifested 10 to 20 years after disease onset. Thus diabetes diagnosed in childhood can result in complications in young adulthood with resultant stress and physical limitations. While very poor diabetic control may contribute to long-term complications and secondary disability, normal blood glucose levels are very difficult to achieve over extended periods of time and may not prevent complications. Thus the adolescent with diabetes must maintain a complex and demanding treatment program designed to achieve near-normal blood glucose levels with no guarantee that adherence will ensure continued good health and prevent serious microvascular complications (Bennet-Johnson & Rosenbloom, 1982; Zimmerman, 1989).

## II. Review of the Research Literature

The onset of insulin-dependent diabetes mellitus in childhood is a particularly stressful occurrence which forces the diabetic child and the family to alter their usual lifestyle, master complex self-care regimens, resolve the emotional upheaval attendant upon diagnosis and adjust to the demands inherent in managing a chronic metabolic disorder with long-term complications and frequent hospitalizations. The nature of the stresses and the child's ability to cope are dependent upon the child's age and emotional maturity. The management and psychosocial issues surrounding diabetes in adolescence are especially complex because of the influence of the hormonal changes of puberty on metabolism and the drive for independence in attaining the developmental tasks of adolescence.

The sources of stress which affect the adjustment of diabetic adolescents are twofold, arising from the subjective psychosocial impact of the disease and the objective medical management tasks which entail regimentation of life, reduced freedom of action and increased psychological discipline (Drash & Becker, 1977; Kovacs & Feinberg, 1982). Therefore, successful adjustment to insulin-dependent diabetes mellitus for the adolescent and family members requires action-oriented behavior to manage the objective correlates of the diabetic treatment

regimen and the preservation of psychic integrity through adaptive coping processes (Kovacs & Feinberg, 1982).

The review of the literature covers four general areas. An overview of adolescent growth and development and the stages of adolescence is included to describe the conceptual framework used to guide the research. The literature regarding the role of environmental and emotional stresses on the onset of diabetes and the ongoing course of diabetes is reviewed with a focus on relevant adult studies and the less extensive child and adolescent studies. The impact of diabetes on the family is described. Finally, the emotional and psychological impact on the child or adolescent with diabetes as well as variables that have been thought to mediate or modify adjustment to diabetes are reviewed. The trends, conflicting results, methodological problems and a suggested focus for further research have been identified for each area of the literature.

**Adolescent Growth and Development**

Adolescence has been considered to be a normative period of developmental disturbance which bridges the gap between the relative psychological stability of childhood and adulthood, encompassing the age range from 12 to 21 years (Bulhman & Fitzpatric, 1987). Hill (1980) described adolescence as a set of primary changes which operate through the social contexts of family, peer relationships and school settings to produce secondary changes in the developing person. The primary changes include the cognitive

ability for abstract reasoning, the alteration of body image and self-concept as a result of puberty and the changing social expectations held by others for the individual's behavior and future goals. The secondary changes are associated with the developmental tasks of adolescence and involve achieving independence from the family and the development of a stable self-identity. Offer (1969) conducted exhaustive psychological research on "normal" adolescents and has noted three developmental rhythms that characterize growth through adolescence. The first corresponds to the "storm and stress" concept of Hall (1904) where adolescents experience emotional upheavals, fail to cope with new demands and fear the future. In contrast, the second group show a drive for power, discipline and self-control. Finally, there is a group of adolescents for whom development is fairly uneventful and for whom little turmoil is observed. Offer (1969) observed that the occurrence of a high level of turmoil was characteristic of only one route from adolescence to maturity.

## Theoretical Perspectives of Adolescence

### Emotional Development

The psychoanalytic theory of Freud (1938) stresses that the underlying force in adolescent emotional development involves re-emerging sexual drives and conflicts. Conflict characterizes the life of an adolescent because the demands of reality (ego) and the moral standards (superego) are never entirely freed from biologic drives (id). Children

pass through a number of psychosexual stages before they enter the genital stage which begins with the onset of puberty. In the genital stage, the defense mechanisms of the ego help the adolescent conform to the pressures of reality and reduce tension. The psychoanalytic view describes adolescence as a recapitulation of earlier development--of working through for the second time, the childhood stages of oral, anal and phallic psychosexual stages. Freud's theory has been described as an outline of phases of psychological disturbance rather than a framework for understanding adolescent growth (Sprinthall & Collins, 1988).

Psychoanalytic theory has utility in understanding anxiety and depression, the two most frequently reported psychological consequences of poor adjustment to diabetes (Bennet-Johnson & Rosenbloom, 1982; Delamater et al., 1987; Kellerman, Zelter, Ellenberg, Dash & Rigler, 1980). Many adolescents experience considerable anxiety with consequences that range from mild uncertainty about the future to suicidal ideation. The defense mechanisms of denial, distortion and reorganization of reality are utilized as a means of psychological protection employed by adolescents to reduce the stress and strain of daily living (Mitchell, 1979). The immediate short term consequence may be a reduction of anxiety and consequently, a greater ability to deal with the external environment. However, the long-term consequences may cause the adolescent to distort reality, to misperceive the motives of others and to deny

authentic feelings. Mitchell (1979) identified middle and late adolescence as the most vulnerable period for psychological disturbance due to emotional strains and stresses.

**Identity Formation**

Erikson (1968) provided a framework for understanding the process of identity formation during adolescence. He proposed an epigentic theory by which psychological development proceeds. At each stage of psychosocial growth, particular challenges or crises are faced and the successful resolution of the crises prepares the adolescent to face the subsequent developmental changes. Erikson modified Freud's theory by placing more emphasis on conscious thought processes and the sociocultural determinants of the adolescent's personality. In Erikson's schema, the preliminary struggle of adolescence is the attainment of an integrated personality. In order to achieve a firm sense of identity, the adolescent must have successfully developed the milestones of trust, autonomy, initiative and a sense of industry in earlier childhood. Once a sense of identity has been established, the adolescent can move into the primary struggle of young adulthood, intimacy versus isolation.

Research on identity, self-concept and self-esteem in mid and late adolescence does not support Erikson's view of the identity crises as a turbulent, stressful experience. Dusek and Flaherty (1981) found that four major factors could be identified in the self-concepts of adolescents: a

sense of adjustment, of achievement and leadership ability, of congeniality or sociability and a perception of relative masculinity or femininity. In a longitudinal study of 1600 teens, Dusek and Flaherty (1981) noted that the components of identity were quite continuous and suggested that identity formation for most adolescents involved successfully meeting a long series of relatively small, minor changes.

Marcia (1980) developed a theory of 4 coping modes or statuses that elaborated upon Erikson's theory of identity formation. The identity statuses are defined according to the presence or absence of a crisis or decision-making period, commitment to chosen values and ideologies and commitment to a selected occupation. Individuals in the status of identity achievement have a relatively stable sense of self, having struggled with a series of personal crises and confrontations and have made a commitment to core moral values. In identity diffusion, there are few commitments to a set of beliefs or principles, and the person seems directionless, having made few occupational or ideological choices. In identity foreclosure, the struggle to establish independence and autonomy is avoided, the roles and values imposed by the parents are passively adopted and the transition to adulthood is relatively smooth. Identity moratorium refers to the ongoing struggle most characteristic of adolescence, the active process of searching for commitment by questioning alternatives

(Marcia, 1980). The formation of a stable identity enables the adolescent to develop mutually open and sharing relationships with others and to establish healthy adult relationships.

**Cognitive Development**

As described in the cognitive theory of Piaget (1972), the thought processes gradually evolve from concrete thinking (concrete operational thought) to abstract thinking (formal operational thought). Intellectual growth results in the ability for more abstract thought and a greater interest in the ideal and the nonphysical. As well, thought becomes more comprehensive, less fragmented and more future oriented. The ability for abstract thought allows the adolescent to view the self in relation to the family and society, to consider the future and to begin formulating values and a life philosophy. Kohlberg (1969) argued that the social, as well as cognitive development of the adolescent should be viewed in cognitive-developmental structural terms. Kohlberg postulated that there were three levels of moral development: the preconventional, the conventional and the post-conventional. Within each level are two stages or systems of judgment. Moral development begins with preconventional thinking in which children obey in order to avoid punishment and ends with the development of a concern for reciprocity among individuals and a sense of universal justice. Although Kohlberg's theory presents a well organized depiction of how moral development may occur,

it has been criticized because of a suspected gender bias in the scoring system that supposedly penalized females and because the framework of post-conventional reasoning did not take into account human caring and compassion. Walker (1984) in a review of 108 studies in which the Kohlberg assessment method was used to analyze a total of 8000 subjects, found no significant differences according to gender. Generally, research results were consistent with the depiction of a universal sequence of moral development for males and females (Sprinthall & Collins, 1988).

**Biologic Changes of Puberty**

The biologic changes associated with puberty are the setting in which all psychosocial developmental changes take place. Puberty is the developmental period during which secondary sexual characteristics emerge and the capacity for sexual reproduction is attained. The initiation and control of puberty is dependent upon the complex interaction between the hypothalamus, anterior pituitary, gonads and body tissue (Finkelstein, 1980). Most females begin puberty between the ages of 9 and 13 years (mean of 11.2 years) and achieve approximately 20% of adult height during the growth spurt which occurs shortly after early puberty is initiated. By mid-puberty, the female is completing her growth and the male is just beginning his. Males achieve puberty later than their female counterparts with the usual age of onset of puberty between 11 and 14 years, and a mean age of 13.4 years (Fujii & Felice, 1987; Tanner & Whitehouse, 1976).

**Developmental Tasks of Adolescence**

There is great variability not only in individual rates of maturation, but also in the sequencing of growth. Within each individual, the levels of various aspects of maturation may not be in synchrony and the adolescent may be at one level in sexual development and at another level in psychological, social or cognitive development. The stages of early adolescence (10 to 13 years), middle adolescence (14 to 17 years) and late adolescence (17 to 21 years) are the time frame during which the following developmental tasks must be completed:

1. Establishing emotional and economic independence from parents and other significant adults;
2. Developing a comfortable body image and self-esteem;
3. Creating an identity through socialization with peers;
4. Attaining a sexual identity, a sexual orientation and participating in intimate relationships;
5. Developing a personal value system and a sense of right and wrong; and
6. Reworking past, present and future personality into an integrated, consistent personal identity (Lohner, 1987; Mehr, 1981).

In addition to these tasks, the diabetic adolescent must also accept the diabetic state and adjust to alterations in the pattern of daily activities.

**Early Adolescence**

This period generally encompasses the age range of 10 to 13 years, begins with the onset of pubertal changes and is characterized by rapid growth and development. The physical and hormonal changes of puberty influence the management of insulin-dependent diabetes mellitus through metabolic changes that are secondary to the production of sex hormones. In addition, the early adolescent is emotionally labile with an undifferentiated increase in restlessness, a shortened attention span and increased compulsivity. This lability and resultant stress may result in increased secretion of neurotransmitters, particularly catecholamine and may adversely affect diabetic control (Travis, Brouhard, & Schreiver, 1987).

In early adolescence, the developmental task of accepting the physical self is of particular significance given the heightened concern about the intactness and capability of the body. The biologic and psychologic selves are not distinctly separated and body image encompasses the corporeal body, the physical attributes and the psychological conceptualizations and feelings about the self. As a result of the rapid body transformations, the young adolescent tends to experience considerable body consciousness especially in relation to the physical attributes of height, weight and complexion (Craig, 1986). Fear of physical illnesses are common and psychosomatic pain such as headaches or abdominal pain are often reported in

the absence of detectable pathology (Malmquist, 1978). Adolescents can be extremely intolerant of deviation, whether it be in body type as in the case of obesity, or a deviation in timing of puberty. Any conspicuous deviance, lag or acceleration in physical maturation may lead to anxiety and fluctuations in self-esteem. Late maturing boys have a more difficult adjustment than early maturing males who tend to accrue social and athletic prestige among their peers. The early maturing female on the other hand, has a more difficult adjustment to her bodily changes and fewer opportunities to discuss with her peers the emotional and physical changes she is experiencing (Livson & Peskin, 1980). For the early adolescent with a chronic illness, diseases that are associated with physical limitations or handicaps may result in feelings of helplessness, dependence and of being different from peers (Buhlmann & Fitzpatrick, 1987).

In early adolescence, intellectual processes tend to be rather concrete and problems may not be acknowledged or may be projected to the external environment (Mitchell, 1979). It is difficult for the adolescent to be able to project mentally into the future toward the goals of preventive diabetic care. In addition, the drive toward separation and independence from parents may interfere with compliance, be expressed in denial of the need to rely on medications and may result in exacerbation of illness. Failure to work toward independence may be indicative of pre-existing

problems in the parent-child relationship including parental overprotectiveness or the perpetration of the adolescent sick-role in order to obtain nurturant attention which has previously been lacking (Hoffman, Becker, & Gabriel, 1976).

**Middle Adolescence**

Middle adolescence generally begins at age 14 and ends at 17 years with full sexual maturity. Physical growth continues but at a less accelerated pace. Height reaches the adult level for most youth. Males add considerable muscle volume and athletic skills increase as the body matures in strength, coordination and stamina. Males for the first time in the life cycle are conspicuously larger than females and are able to outperform most females in muscular strength and physical endurance (Fujii & Felice, 1987). During this stage, teenagers become less preoccupied with their bodily changes and involvement with peers becomes more intense. Teens move toward greater self-autonomy, increased interest in the opposite sex and more complicated relationships with the family unit. Experimentation with adult roles within the peer group provides the adolescent with more security and stability in exploring individual sexuality and separating from parental influence. Youths become more emotionally complex during adolescence and intimacy and romance occur for the first time for many teens (Sprinthall & Collins, 1988). Behavioral experimentation such as risk-taking behaviors, drug and alcohol use is common. The increasing cognitive capacities, physical power and social skills of

mid-adolescence are accompanied by a sense of being invincible and invulnerable (Elkind, 1978). However, the combined effects of physical maturity, increased autonomy and heightened sexual awareness creates a considerable amount of turmoil, introspection and self-doubt (Mitchell, 1979).

The greatest caloric requirement for sustaining growth occurs during middle adolescence. At age 14, girls are at the peak of their daily requirements needing about 2,800 calories per day. By age 17, the requirement for males has increased to about 3,400 calories per day to sustain normal growth. Abuse of nutrition is common and obesity may result (Brusch, 1986). The activity level of many mid adolescents is increased due to involvement in organized sports and school programs. This increased physical activity modifies the utilization of glucose and has particular consequences for adolescents with diabetes. Home blood glucose monitoring for diabetic teens is often introduced at this stage and the physically active adolescent is encouraged to modify his activity regimen, dietary plans and insulin dosage in accordance with blood glucose values. Risk taking behaviors such as drug or alcohol use may result in episodes of diabetic ketoacidosis or in poor general control of diabetes. As well, fad behaviors and dieting efforts in which adolescents participate are often inimical to the appropriate management of diabetes (Leichmann & Friedman, 1975; Travis et al., 1987).

**Late Adolescence**

The onset of late adolescence coincides with full sexual maturity, generally at 17 years of age or older. The major task of late adolescence is to assume responsibility for self care and to separate from the nuclear family. Late adolescents understand their parents better and have a more realistic appraisal of their parents strengths and weaknesses. As well, adolescents may have fundamental or even irreconcilable differences with their parents. These may include matters pertaining to dropping out of school, maintaining a part-time job, sexual involvement or abstaining from sexual intercourse, drugs and alcohol use and preparation for a future occupation (Lohner, 1987).

Many diabetic adolescents, who have experienced management difficulties in early and middle adolescence will continue to have problems in late adolescence, and in some instances, well into adult life. Ambivalent parent-child attachments may result in a difficult separation from parents, just as enmenshed, over-directive parent-child attachments may result in adolescent rebellion (Travis et al., 1987). The late adolescent with diabetes living away from home must provide for medical emergencies by teaching a friend methods for managing insulin reactions (Travis et al., 1987). The issue of marriage and childbearing is a further concern. Early pregnancy (by the late 20's) is usually recommended, and worries about the possible physical

complications of diabetes create additional pressures on intimate relationships (Younger et al., 1985).

**Depression in Adolescence**

Depression is increasingly being recognized as a significant problem among children and adolescents. Depression involves a dysphoric mood with at least four of the following factors: poor appetite, sleep difficulties, psychomotor retardation or agitation, decreased interest in normal activities, decreased ability to concentrate, excessive guilt and suicidal thoughts (Diagnostic and Statistical Manual of Mental Disorders, 3rd Edition, 1987).

Developmental and psychological factors play a role in the etiology of childhood depression. Dweck and Repucci (1973) suggested that children can learn a helpless and hopeless stance as a result of repeated failure. Holmes and Rahe (1967) proposed that significant stresses, especially family psychopathology and marital discord, were implicated in the development of childhood depression. Kovacs and Beck (1978) developed a cognitive distortion model of depression in which unfavorable life experiences can lead to negative assumptions, particularly related to low self-esteem and poor body image. Finally, the family system has been implicated in childhood depression. In a study of suicidal latency age children Pfeffer (1985) found that the family system exhibited a lack of generational boundaries, conflicted relationships between spouses, symbiotic parent-child relationships and inflexible family structures.

Adolescent studies on depression report a large range of findings among the general population. Studies conducted prior to the acceptance of the Diagnostic and Statistical Manual of Mental Disorders (1987) diagnostic criteria are difficult to compare due to variations in the populations studied and the differing diagnostic criteria utilized. Rutter, Graham and Chadwick (1976) reported a 1% prevalence rate of depression in school age children. Earls (1984) found a 4% to 8% range of preschool children who were depressed and reported a significant increase in depression from middle childhood through adolescence and into adulthood. Pfeffer (1985) estimated that 2% of preadolescents have severe depression and over 17% have evidence of sadness. She noted the prevalence of 8% for depression in adolescents. Kashani and Symmonds (1979) in a study of depression in the general population, identified 17.4% of adolescents with sadness as a symptom and 1.9% who met the criteria for a major depressive disorder. Rierdan, Koff and Stubbs (1987) found a strong relationship between depressive symptomatology and negative body image in a sample of 535 girls aged 12 to 16 years. Of the sample, 64% evidenced no or minimal depression, 14% mild depression, 17% moderate depression and 5% severe depression. The finding of a negative body image was independent of the individuals developmental status and was not moderated by grade, menarcheal status or pubertal timing.

Other recent studies note a depression incidence of 20% among adolescents with severe psychiatric problems and adolescents with medical problems such as major orthopedic disorders and cancer (Hodgman, 1985; Kaplan, Hong, & Weinhold, 1984). Depression has been studied in adult diabetics by Mazze, Lucido and Shamoon (1984) who found no significant difference in personality, anxiety, depression and quality of life for adult diabetics when compared to nondiabetics. In a study of 60 diabetic children and adolescents aged 9 to 18 years who were investigated for emotional difficulties in association with their diabetic control, 12% of the adolescents were considered to be depressed (Close, Davies, Price and Goodyer, 1986).

Variations in body image, ego development and cognitive functioning, interpersonal relationships with family and peers and sex roles have been theoretically or empirically associated with depression. Since important changes in and among these variables occur over the course of adolescence, studies of the relationships between these variables and depressive symptomatology should be placed in a developmental context. Further, since rates and patterns of developmental change in these variables may differ as a function of gender, gender needs to be considered as a possible moderator of the correlates and causes of adolescent depression.

**The Role of Emotional and Environmental Stress in the Onset of Diabetes**

The interaction between the psychological and physiological has interested observers for hundreds of years. In a review of the psychological factors in diabetes mellitus, Greydanus and Hofmann (1979) noted that reported evidence connecting emotional factors to the etiology of diabetes mellitus have primarily been clinical case studies in which researchers observed disease onset following sudden stressful environmental occurrences or patterns of association between diabetes onset and psychiatric illness. Cannon, Sholl and Wright (1911) conducted experiments on "emotional glycosuria" and hypothesized that the stress of rage or fright caused stimulation of the sympathetic nervous system, resulted in increased secretion of epiniphrine and caused glycosuria. Pike (1921) noted an association between psychiatric illness and onset of diabetes, and Menninger (1935) described "psychogenic diabetes". In a review of 22 cases of psychiatric illness associated with diabetes, Menninger noted 4 cases where a psychosis occurred with the onset of diabetes and concluded that diabetes may be the direct result of psychological disturbances. Daniels (1939, 1948) reviewed research on the role of emotions and the onset of diabetes and noted that diabetes could be precipitated following sudden stressful environmental occurrences or severe emotional trauma. He concluded that stress could influence the course of diabetic control but

that the role of stress in diabetes onset had not been demonstrated through well-controlled studies.

More recent studies of the impact of emotions on the onset of diabetes illustrate the difficulties of generalizing research based on clinical observations. Slawson, Flynn and Kollar (1963) noted a history of recent object loss, patterns of unresolved grief and emotional deprivation in 14 out of 25 newly diagnosed adult diabetic patients and concluded that adult-onset diabetic patients may be more vulnerable to specific stress. In a study of adolescents, Stein and Charles (1971, 1975) conceptualized diabetes as a disease of disordered psychological and physiologic adaptation and concluded that juvenile diabetes occurs secondary to psychological stress in a physiologically vulnerable individual. In their study of 38 diabetic patients and 38 chronically ill patients matched in terms of separation, divorce and family disturbance, the authors noted a significantly higher incidence of severe family disturbance and parental loss for the diabetic adolescents. However, many of the parental losses occurred 6 to 10 years prior to diabetes onset and the connecting link to the development of diabetes was not demonstrated.

The conclusions of these studies reporting the effects of emotional and environmental stress on the etiology of diabetes are problematic given the research design, selection bias in study subjects, small sample size and reliance upon observed clinical data to support hypotheses.

The general concept of a prediabetic state which is transformed to diabetes by environmental stressors is not conclusively supported in the research literature and the mechanisms that might link stressful events and the onset of the diabetic syndrome have not been clearly identified (Greydanus & Hofmann, 1979; Hauser & Pollets, 1979).

**Psychosocial Environment and the Course of Diabetes**

A number of research studies have been conducted to explore the relationship between psychological stress and the course of diabetes. The findings suggest that diabetes control may be adversely affected by events which generate anxiety, intrapsychic conflicts, threats to personal security and emotional deprivation (Hauser & Pollets, 1979). Life stress has been thought to affect metabolic control through a direct action of the stress hormones on physiologic functioning (Baker, Minuchin & Rosman, 1969; Hinkle & Wolfe, 1952; Minuchin, Rosman & Baker, 1978). The results of these investigations which utilized stress interviews and hypnosis studies suggest that although the effects of stress on blood sugar levels may be inconsistent, increases in free fatty acids in the blood, urine ketone levels and urine volumes occur in response to life stress.

The broader area of stressful life changes was studied by Holmes and Rahe (1967) who rated recent life events requiring readjustment to developmental and situational life stresses in terms of relative impact on the individual. Grant, Kyle, Teichman and Mendels (1974) reported low

positive correlations between undesirable life events and changes in diabetic symptoms. Holmes and Masuda (1974) emphasized that the cumulative effect of "life crisis units" affected the diabetic course, rather than a specific traumatic event. In a review of research on life stress events, Kimball (1971) hypothesized that situations in which the individual is repeatedly forced to deal with stressful events leads to a diminished ability for readjustment, adaptation and homeostasis. This diminished adaptive capacity may in turn lead to feelings of helplessness or depression with concomitant physiological effects.

Adolescent life change events have been studied in an attempt to identify potential stressors and to quantify stress. Events which adolescents reported as being particularly stressful were related to death, separation in the family, failures at school, interpersonal conflicts, drug and alcohol abuse, sexual activity and violent behaviors (Yeawork, York, Hussey, Ingre & Goodwin, 1980). Kosub and Kosub (1982) reported that illness-related stressors identified by diabetic children and adolescents were those events that interfered with or threatened the developmental tasks related to the establishment of personal identity, attaining independence and fostering peer relationships.

Relatively few studies of the effects of life stresses in diabetic children and adolescents have been conducted. Bedell, Giordani, Amour, Tavormina & Boll (1977) utilized

the children's version of the Social Readjustment Scale (Holmes & Rahe, 1967) to separate chronically ill summer campers into high and low life stress groups. Significant between group differences were found. During the three weeks of camp, the high stress group experienced 69 episodes of illness as compared to 19 episodes of illness in the low stress group. Overall, the low stress children had a more positive self-concept than the high stress children. Finally, of the 12 diabetic campers, those children with the poorest metabolic control reported the most acute life stress occurrences such as chaotic lifestyles, marital conflicts or death of a parent. Chase and Jackson (1981) studied the relationship between life stress and metabolic control in 84 children and adolescents with insulin-dependent diabetes mellitus. The frequency of stressful life situations was only associated with poor metabolic control in the older diabetic adolescents aged 15-18 years.

In a review of the literature on stress and metabolic control Barglow et al. (1983) concluded that diabetic youths have different personality configurations than their non-diabetic peers and exhibit a neurohormonal stress response with subsequent hyperglycemia and ketogenic effects. Barglow et al., in their study of the interaction between personality factors and metabolic control, reported that age, duration of illness, life events changes and ego development were significantly related to the quality of metabolic control. Life event changes were the most

important predictor of control, a finding consistent with the results obtained by Chase and Jackson (1981). Brand, Johnson and Johnson (1986) furthered this research by focusing on only negative or undesirable life changes. As well, locus of control orientation, gender and age were evaluated as possible moderators of life stress. The variable most consistently related to negative life change was urine ketone levels for the 10-12 year age group. The authors concluded that negative life changes were most highly related to measures reflecting the breakdown of body fats in preadolescent diabetics.

Delamater et al. (1987) found no physiological difference in the stress response of well versus poorly controlled diabetic adolescents. However, the authors concluded that the ways in which the diabetic teens appraised and coped with stress, rather than the degree of stress itself was related to metabolic control. Poor metabolic control was associated with an appraisal of the stressor which leads to inhibition of action and a coping pattern which included avoidance and wishful thinking. Hanson, Henggler and Burghen (1987) studied the relationships between psychosocial variables (adolescent age, chronic life stress, social competence and self-esteem, family relationships and family knowledge about insulin-dependent diabetes mellitus) and health outcome measures of adherence and metabolic control in 104 adolescents with insulin-dependent diabetes mellitus and their mothers.

Through multiple regression analysis, stress was shown to be positively correlated with glycosylated hemoglobin levels (HbAlc), consistent with the findings of previous investigators (Barglow et al., 1983; Chase & Jackson, 1981). These findings suggest that stress is directly linked with metabolic control through a physiological mechanism. Social competence in the form of adequate self-esteem in the areas of family, school and peer adjustment and parental support buffered the adverse relationship between metabolic control and stress, a finding consistent with the developmental transitions that occur during adolescence. Knowledge about insulin-dependent diabetes mellitus, family relationships and adolescent age had direct effects on adherence. The authors noted that associations found between psychosocial variables and health outcome measures accounted for only 18.5% of the variance in predicting adherence, and 14.5% of the variance in predicting metabolic control.

Empirical studies in which emotional and physical stresses were related to deterioration of metabolic control in diabetic youths have been based on adult studies. Early research on adult physiological response to laboratory induced stress was fraught with methodological problems. Mental arithmetic exercises, a reliable method of inducing stress, may not be applicable to daily life. Stress interviews, which appeared to be relevant to daily life experiences, have not been demonstrated to be reliable (Jacobson, 1986; Williams, 1988). The direct "psychosomatic"

model does not explain the majority of cases of poor metabolic control. A multisystematic approach which explores mediating variables relevant to children and adolescents such as coping responses, adherence behaviors, social competence and family relationships has had more predictive power (Delamater et al., 1987; Hanson et al., 1987). Further research should be directed toward identifying the specific problems which diabetic adolescents view as most distressing, and identifying maladaptive and adaptive patterns of coping with diabetes, related to the developmental age of the youth. Finally, if clinically significant and readily detectable stress sensitivity is empirically observed, a benefit could exist in detecting youths for whom behavioral stress reduction therapy would be applicable.

**Diabetes and the Family**

An authoritative, relatively democratic family atmosphere has been correlated with healthy or normal behavior in adolescence. Baumrind (1968) described distinctions among authoritarian, authoritative and permissive parents and noted varying degrees of independence, social responsibility and achievement orientation among the children. Authoritarian parents were strict and controlling whereas permissive parents made few demands and favored reason and persuasion in interactions with their children. Authoritative parents had firm boundaries and expectations for their child's behavior.

Baumrind noted that self-reliant, self-controlled and contented children came predominantly from authoritative families. In contrast, children of authoritarian parents were submissive, dependent, less socially responsible or achievement oriented. Elder (1963) studied family communication patterns in a sample of over 7,000 adolescents. He concluded that democratic families fostered nuturant parent-child relationships and that adolescents from these families were more self-confident and independent than were adolescents from autocratic families.

Family functioning is considered to be a major mediating variable which influences the diabetic child's emotional adjustment, compliance with the treatment regimen and attainment of metabolic stability (Marteau, Bloch & Baum, 1987). Parenting style, family relationships, adaptation to changes in life style, community support and personality characteristics of the parents and children are all aspects of family functioning that affect metabolic control (Newbrough, Celeste, Simpkins & Maurer, 1985).

The psychological response of parents to the initial diagnosis of insulin-dependent diabetes mellitus in their child has been a primary focus in the early literature. The immediate emotional upheaval in response to diagnosis has been expressed as anxiety, disbelief, grief, nightmares, sleep disturbance, psychosomatic symptoms and hysterical behavior (Koski, 1969; Kovacs & Feinberg, 1982; Seidman & Swift, 1971; Tietz & Vidmar, 1982). The subsequent

resolution of distress and the acceptance of diabetes has been described as a process similar to grief and mourning (Seidman & Swift, 1971; Tarnow & Tomlinson, 1978). Kovacs et al. (1985) examined the adjustment of parents in the first year following the diagnosis of insulin-dependent diabetes mellitus in their child. Parents were rated as only mildly and subclinically depressed or anxious, and the initial reactions generally resolved within six months. These findings did not support the earlier reports of heightened emotional disturbance or maladjustment among the parents of diabetic children and may reflect the use of standardized symptom scales that focused on the parents themselves, rather than on their feelings about the child and diabetes. Adjustment to the diagnosis and the resolution of parental distress has been inferred from a firm, calm yet supportive and flexible attitude expressed by the parent toward the child and diabetes care (Koski, 1969; Kovacs & Feinberg, 1982; Olatawura, 1972).

In a review of research studies investigating parental adjustment to their diabetic children of all ages, Anderson and Auslander (1980) identified four general types of maternal attitudes: overanxious and overprotective; overindulgent and overpermissive; controlling and perfectionistic; and indifferent or rejecting. Parental indifference was considered by Khurana and White (1970) to have the most serious effect on the diabetic child, contributing to poor metabolic control and depression.

Overindulgent maternal attitudes led to maladjusted children with poor compliance. Finally, children who were well adjusted and maintained good metabolic control had mothers who were described as tolerant, flexible and consistent (Brusch, 1949; Fischer & Dolger, 1946; Khurana & White, 1970). Grey, Genel and Tambourlane (1980) identified parental self-esteem as a predictor of family functioning and the child's self-esteem and psychosocial adjustment, which in turn were predicting control.

Investigations into the role of family group relationships have studied patterns of cooperation and conflict among all family members in managing the diabetic treatment regimen. A series of studies focused on the subset of children and adolescents with psychosomatic or "brittle" diabetes, who experienced recurrent episodes of ketoacidosis or hypoglycemia requiring hospitalization. In one such study, Baker et al. (1969) investigated the relationship between stress, family functioning and diabetic ketoacidosis. The families of these diabetic children utilized coping patterns of triangulation, of parent - child coalition and of detouring parental conflicts by protecting or blaming the diabetic child. Minuchin et al. (1978) identified interactional patterns of enmeshment, overprotectiveness, rigidity and lack of conflict resolution as contributing to and maintaining family homeostasis at the expense of the physiologically vulnerable diabetic child.

In recent studies of the effects of family relationships on metabolic control and psychosocial adjustment, the general population of diabetic children has been investigated as opposed to the smaller subset of "brittle" or poorly controlled diabetics. Families with diabetic children have been described as experiencing more stress than control families and more marital conflict (Crain, Sussman & Weil, 1966; Gath, Smith & Baum, 1982; Koski, Ahlas & Kumento, 1976). Gath et al. (1982) in a study of 76 families with a diabetic child reported that 33% of families experienced significant life stress as compared with 20% of control families. In this study, 66% of families with a diabetic child were described as coping adequately. Simmonds (1977) noted the stressful impact of the child's degree of metabolic control on family functioning. Families with diabetic children in good control had fewer conflicts than those in poor control. Schafer, Glasgow, McCaul and Dreher (1983) found weak relationships between general aspects of family functioning and diabetic control, but noted that family conflict was correlated with the reported frequency of blood glucose testing. The indirect relationship of increased family conflict was significantly related to metabolic control.

In a study of the relationship between family environment and behavior symptomatology, Wertlieb, Hauser and Jacobson (1986) compared a group of recent-onset insulin-dependent diabetes mellitus children and a control

group of children with recent acute illness on measures of adjustment, cognitive development, family processes and life stress. There were no symptom differences noted between groups who were comparable in terms of perceived competence and self-esteem. Behavior symptoms such as depression, withdrawal, impulsive or aggressive acts were associated with overt family conflict in both groups. Family environments unsupportive of the adolescent drive toward independence and self-sufficiency were associated with internalizing symptoms (depression and withdrawal) by the diabetic group. Finally, Marteau et al. (1987) noted that children in good metabolic control had families characterized by cohesion, emotional expressiveness, lack of conflict and maternal satisfaction with the marriage.

Stress, disturbed family interactional patterns and potential effects on parental self-esteem appear to be the major family-related complications of childhood diabetes. Poor family adjustment has been associated with poor metabolic control in the diabetic child. It is possible that family factors may affect the child either directly through stress-associated metabolic imbalance or indirectly through effects on adherence to treatment regimens. The early literature on the impact of diabetes on family function must be viewed with caution as these studies were often based on families that were referred to mental health professionals. Hence these families may not be representative of the general population and the study findings focus on

descriptions of psychopathology rather than on factors which contribute to successful adjustment. As well, causality cannot be inferred, in that the families were studied after the diagnosis of diabetes in the child or adolescent. It is not possible to determine whether dysfunctional interaction patterns existed in the family prior to the diagnosis of diabetes. Finally, in studies of 'brittle' diabetes, it is possible that episodes of hyperglycemia, hypoglycemia and frequent hospitalizations are likely to create additional stress in the family, hence the greater subjective appraisal of stress reported in these studies.

The role of fathers and siblings in diabetes management has not been adequately addressed. It is probable that fathers have become more centrally involved as a result of the increased participation in child rearing by males and the departure from traditional sex roles. As well, more information is needed about the siblings' participation in diabetes care, responses to the diabetic child and the impact of the siblings' age and birth order on the family's adjustment to diabetes. Finally, the diabetic child may have differences in temperament which impact on parental behaviors and parent-child interactions. Temperament refers to the way in which the adolescent typically behaves such as activity level, pattern of reactivity and speed of movement, regularity with routines, intensity and character of mood expression and distractibility and persistence (Rovet & Hoppe, 1988). A relationship between temperament and

glycemic control was described by Rovet & Hoppe. Children with higher levels of activity, regularity in routines, milder reactions to external stimuli and negative mood achieved better glycemic control. The relationship between these variable of temperament and control was not able to be explained. Further research on individual child characteristics, including temperament, should be examined to better understand the reciprocal influences between family members.

Two areas of research on family adjustment to diabetes care should be further explored, related to identifying family strengths and successful strategies for coping with the treatment regimen, and identifying the linkages between the family system and the external environment that impact on adjustment. The personal-social support network of the child and parent which include the child's peers, extended family members, consumer diabetes organizations, parent and teen support groups and the multidisciplinary out-patient treatment programs, have been recognized as important variables that enhance adjustment, but have not been empirically studied. Finally, further study of the multiple determinants of family adjustment to diabetes and the mutual interactions between the diabetic youth and the family should focus on a longitudinal rather than a cross-sectional approach.

**Psychological Adjustment of the Diabetic Child or Adolescent**

Empirical studies on the personality characteristics of diabetic children have been a major focus of research. Psychological factors have been identified as a significant consequence of diabetes, determining the immediate and long-term adjustment of the individual. Two interrelated themes have been investigated: the presence of unique psychopathology associated with insulin-dependent diabetes mellitus, and the identification of differences between diabetic patients who manage their diabetes successfully and maintain good control and those who have labile or poor control (Hauser & Pollets, 1979). The identification of a "diabetic personality" which is shaped by the attitudes and reactions produced by diabetes and which determines the adjustment of the child, has been the focus of conflicting results in the literature. While it seems that psychological disturbances are frequently associated with diabetes, a causal relationship has not been conclusively established (Dunn & Turtle, 1981; Johnson, 1980; Williams, 1988).

The child's immediate reaction to the diagnosis of diabetes has been described as a traumatic anxiety, feeling helpless, depression, a fear of death and as being similar to grief and mourning. These feelings may be transmitted to the child by the parents, and may be shared by other family members (Koski, 1969; Kovacs & Feinberg, 1982; Seidman & Swift, 1971; Tarnow & Tomlinson, 1978; Tietz & Vidmar, 1982). Two recent studies of newly diagnosed children and

adolescents with insulin-dependent diabetes mellitus did not report major disruptions of psychological adjustment. Jacobson et al. (1986) compared 64 children aged 9 to 15 years (mean age 12.7 years) with recent onset of insulin-dependent diabetes mellitus and 68 control children with recent acute medical problems who were matched by age and gender. No significant between-group differences were found in terms of self-esteem, locus of control, behavior symptoms or social functioning. The researchers did report that the measures of self-esteem, locus of control and behavior symptoms were strongly correlated with diabetes adjustment, and suggested that early adjustment to diabetes is one aspect of the child's overall pattern of coping and adaptation. The results suggested that onset of diabetes does not inherently imply psychological problems early in the course of the illness. This conclusion was supported by Kovacs, Brent, Steinberg, Paulauskas, & Reid (1986) who suggested that maladjustment would become evident only with prolonged illness when adaptive coping behaviors are exhausted. Kovacs et al. (1986) studied 74 children aged 8 to 13 years (mean age 11 years) with recent onset of insulin-dependent diabetes mellitus. The level of adjustment was inferred from self-rated scales of self-esteem, anxiety and depression and coping strategies were categorized into cognitive strategies and behavioral goal oriented strategies. No relationship was found between psychological adjustment, psychiatric diagnosis and illness-related coping

behaviors. Demographic variables such as age, sex, and socioeconomic status did not correlate with indices of illness severity or with level of adjustment. In spite of the impact of a major life event, the children's self-ratings indicated few emotional symptoms and good self-esteem.

**Relationships of Nonpersonality Factors to Adjustment**

Gender, birth order, current age, age at onset and duration of illness have been identified as factors that may affect metabolic control adherence to the treatment regimen and the psychosocial adjustment of diabetic children and adolescents. Travis et al. (1987) suggested that the age of the child and initial experience of diabetic symptomatology at the time of diagnosis were major factors in adjustment to insulin-dependent diabetes mellitus. The initial experience for the diabetic child was a time of heightened parental anxiety, when the complexities of the treatment regimen were being mastered and when frightening episodes of insulin reactions and ketoacidosis were likely to occur. Fischer and Dolger (1946) and Olatawura (1972) did not find relationships between age at onset of insulin-dependent diabetes mellitus and subsequent metabolic control. Although Tietz & Vidmar (1982) did not find correlations between age at onset, duration of disease, number of siblings and metabolic control, they observed that children entering puberty had poorer control. This finding was supported by Guthrie and Guthrie (1975) who suggested that early onset in

childhood or late adolescence onset of diabetes was related to less successful adjustment, and that the hormonal changes accompanying adolescence adversely affected metabolic control. Several authors suggested that onset of diabetes in childhood results in much poorer control (Sterky, 1963; Swift, Seidman & Stein, 1967); while others note that late onset was related to poorer control and negative attitudes toward treatment (Ludvigsson, 1977; Sullivan, 1979a, 1979b). Although study results are conflicting, it appears that the developmental stage of the child at onset of insulin-dependent diabetes mellitus is an important factor in the adjustment of the adolescent and subsequent metabolic control.

Conflicting results have been reported regarding the effects of birth order and the duration of diabetes on the emotional adjustment of the diabetic child and metabolic control. While Tietz & Vidmar (1982) found no relationship between duration of diabetes and control, Ludvigsson (1977) noted that good control increased for about 10 years following diagnosis and then subsequently deteriorated. Koski (1969) found that good metabolic control was related to being the oldest child in the family; whereas Swift, Seidman and Stein (1967) noted that first born children may have more problems with control than only children or later born children, and that diabetic control deteriorated with the increased duration of insulin-dependent diabetes mellitus. These contradictory results emphasize the need to

investigate metabolic control within the context of the developmental level of the child with insulin-dependent diabetes mellitus, and to consider the effects of birth order, age and spacing of siblings in the family at the time of diagnosis and at the onset of puberty.

Recent findings suggest that the effects of insulin-dependent diabetes mellitus on cognitive and psychosocial adjustment may be different for females than males and that these differences may depend on the child's chronological age at the onset of disease. Lavigne, Traisman, Marr and Chasnoff (1982) noted poorer psychological adjustment, hyperactivity and aggression in diabetic boys than in diabetic girls or sibling controls, and that longer duration of illness correlated positively with the increased incidence of behavior problems. Ryan and Morrow (1986) in a study of 125 diabetic and 82 nondiabetic adolescents found that adolescent girls who developed early onset diabetes (before age 5 years) had lower global self-concept scores than early onset boys, specifically limited to physical appearance and anxiety scales, whereas non-diabetic boys and girls had comparable global self-concept scores. The gender and age at onset interaction effect on adolescent self-concept were attributed to the development of different, gender specific strategies for coping with the psychosocial problems associated with insulin-dependent diabetes mellitus. Alternately, it was suggested that the poor self-esteem of early onset diabetic girls reflected the tendency

for these girls to be heavier, somewhat shorter and less sexually mature than girls of similar age with late onset of diabetes. Rovet, Ehrlich and Hoppe (1987) found that boys who developed insulin-dependent diabetes mellitus after age 5 years tended to have more behavior problems than early onset boys, or diabetic girls in general. Girls who developed diabetes before age 5 years were reported to have greater school difficulties both socially and academically. This finding was attributed to a possible neurological dysfunction resulting from both early onset effects and hypoglycemic convulsions.

Insulin-dependent diabetes mellitus has not traditionally been associated with impaired intellectual functioning in children (Dunn & Turtle, 1981). However, several studies indicate that two factors, gender and age of developing diabetes are associated with cognitive and neuropsychological impairments. In an early study of the intellectual functioning of diabetic children, Ack, Miller and Weil (1962) reported that children who developed insulin-dependent diabetes mellitus before age 5 years had significantly lower IQ levels than non-affected siblings. This finding was attributed to the effects of episodes of hypoglycemia or acidosis during early brain development with a subsequent negative impact on the child's intellectual abilities. Late onset diabetic children (after age 5 years) showed no difference in IQ levels. School performance or associated learning problems were not correlated with age at

diagnosis of insulin-dependent diabetes mellitus. Gath et al. (1982) compared 70 diabetics and 70 nondiabetic children in "reading readiness" and found that 28% of diabetic children were over 2 years behind in reading as compared to 19% of nondiabetic children. This delay in reading readiness was associated with the degree of recent metabolic control and psychosocial disruptions within the family. Ryan et al. (1984) documented lower intellectual functioning of diabetic adolescents as compared to nondiabetic controls although performance was within the average range of abilities. In a second study, Ryan, Vega and Drash (1985) noted that diabetic adolescents demonstrated significantly poorer memory, attention and a slower rate of nonverbal responding. Early age of disease onset (under 5 years) was related to impaired visual/motor skills, whereas disease duration was associated with impaired verbal skills. In a study of the interrelationships between school attendance and academic achievement, Ryan, Longstreet and Morrow (1985) noted that diabetic adolescents missed twice as much school as nondiabetic adolescents, and that school absence correlated with scores on reading, spelling and arithmetic cognitive tests. Rovet et al. (1987) reported that girls with early onset of diabetes (before age 5 years) demonstrated greater school difficulty both socially and academically. This finding was attributed to a possible neurological dysfunction resulting from both early onset of diabetes and

the higher frequency of hypoglycemic convulsions reported for girls with early onset of diabetes.

Ryan (1988), in a review of research studies of neurobehavioral complications of insulin-dependent diabetes mellitus, concluded that serious neurobehavioral disorders are a relatively rare complication of insulin-dependent diabetes mellitus, but that detectable reductions in overall mental efficiency occur more frequently. It has been hypothesized that the developing brain of a young child is particularly vulnerable to multiple episodes of hypoglycemia and that hypoglycemic seizures or coma increase the risk of brain dysfunction such as memory and attention deficits, impaired visual/motor skills and impaired verbal skills (Grunt, Banion, Ling, Siegel & Frost, 1978; O'Leary et al., 1983; Ryan, 1988). The results of neurobehavioral research in diabetic children and adolescents must be interpreted with caution as the complex interrelationships between neurobehavioral function, metabolic control and psychosocial factors such as age and gender have not been explored conclusively. Cognitive skill deficits may be a contributing factor to poor management of the diabetic regimen. Further research with children and adolescents is necessary to establish the role of diabetes-related cognitive impairments, in acquiring diabetes management skills and achieving adequate metabolic control

The developmental task viewpoint offers an alternative way to study intrapersonal adjustment of diabetic children

and adolescents. Chronological age significantly influences the attainment of psychosocial and cognitive tasks, coping abilities and the world view of the child. Therefore the diabetes management regimen presents different intellectual and psychosocial challenges at different age levels. The child's developmental stage influences responses of the family members toward the child and diabetes care. Subsequent adjustment to diabetes may be profoundly affected by the interaction of illness factors and specific developmental tasks of the child's age group. The unique disease manifestation in the individual child must be considered. Children with residual pancreatic beta-cell function may be easier to manage and have a more stable course. As well, basic metabolic processes change with the child's growth and development. At periods of rapid growth fluctuations such as puberty, regulation of metabolic control becomes problematic. Finally, identity, independence, body integrity, privacy and a desire to be similar to peers are all major concerns for teenagers. Each is a factor that is affected by the daily diabetic care regimen of the adolescent with insulin-dependent diabetes mellitus. Therefore, the way in which particular characteristics of insulin-dependent diabetes mellitus interact with particular age-related developmental tasks warrants further investigation.

**Purpose of the Study**

The purpose of the study was to explore the relationship between self-esteem, depression and adjustment to diabetes in adolescents with insulin-dependent diabetes mellitus. Specifically, the life adjustment of diabetic adolescents in peer and family relationships, dependence-independence conflicts and attitudes towards diabetes were investigated. As well, the relationship between gender, age at onset of diabetes and length of time since diagnosis, in adjustment to insulin-dependent diabetes mellitus, levels of self-esteem and depression were explored.

**Definition of Terms**

The terms to be defined are self-esteem, adjustment to diabetes, depression and age at onset of diabetes.

**Self-esteem**: The expression of approval or disapproval, indicating the extent to which a person believes himself competent, successful, significant and worthy (Coopersmith, 1981).

**Adjustment to Diabetes**: The individual's attitudes, feelings and coping behaviors towards diabetes, the management regimen, the impact of diabetes on daily functioning and on interpersonal relationships with friends and family (Sullivan, 1979a, 1979b).

**Depression**: A gloomy feeling about life, often combined with a significant lack of interest in general activities and a failure to find much joy in living (Greydanus, 1986). Depression involves a dysphoric mood with at least four of

the following factors: poor appetite, sleep difficulties, psychomotor retardation or agitation, decreased ability to concentrate, and excessive guilt and suicidal thoughts (Diagnostic and statistical manual of mental disorders, 1987). In adolescence, depression may be masked and expressed as boredom, restlessness, anxiety, a drop in school performance with difficulty concentrating, impulsive behavior, delinquent acts, substance abuse, sexually acting out or eating disorders (Malmquist, 1978; Mishne, 1986).

**Age at Onset**: The chronological age of the child at the time insulin-dependent diabetes mellitus is diagnosed. Early onset insulin-dependent diabetes mellitus refers to children who develop diabetes before age 5 years. Neurobehavioral complications such as nonspecific impairments on measures of learning, memory, problem solving and biospatial ability are more frequently manifested in children with onset of diabetes before age 5 years (Rovet et al., 1987; Ryan, 1988). Children diagnosed after age 5 years are considered to have late onset of insulin-dependent diabetes mellitus. The group of late onset adolescents were further divided into two groups for the purpose of studying the effects of onset of diabetes during puberty.

**Research Questions**

1. Do diabetic adolescents who are poorly adjusted to diabetes have lower self-esteem than those who are well adjusted?

2. Are diabetic adolescents who are poorly adjusted to diabetes more depressed than those who are well adjusted?
3. What is the relationship between levels of self-esteem and depression on the degree of adjustment among diabetic adolescents?
4. Is the degree of adjustment to diabetes, level of depression or self-esteem related to the gender of the diabetic adolescent?
5. Is the degree of adjustment to diabetes, level of depression or self-esteem related to the age of the adolescent at onset of diabetes?
6. Is the degree of adjustment to diabetes, level of depression or self-esteem related to the number of years since diagnosis of diabetes?

**Hypotheses**

1. Adolescents who are well-adjusted (as measured by the Diabetic Adjustment Scale) will show higher levels of self-esteem (as measured by the Coopersmith Self-Esteem Inventory) than diabetic adolescents who are poorly adjusted.
2. Adolescents who are well-adjusted (as measured by the Diabetic Adjustment Scale) will show lower levels of depression (as measured by the Children's Depression Inventory) than diabetic adolescents who are poorly adjusted.
3. There will be no differences between males and females in

levels of adjustment to diabetes (as measured by the Diabetic Adjustment Scale), levels of self-esteem (as measured by the Coopersmith Self-Esteem Inventory) or levels of depression (as measured by the Children's Depression Inventory).

4. Diabetic adolescents diagnosed before the age of five years will demonstrate poorer levels of adjustment to diabetes (as measured by the Diabetic Adjustment Scale), lower levels of self-esteem (as measured by the Coopersmith Self-Esteem Inventory) and higher levels of depression (as measured by the Children's Depression Inventory) than will diabetic adolescents diagnosed at five years of age or older.
5. Diabetic adolescents diagnosed between 1 and 3 years will demonstrate poorer levels of adjustment to diabetes (as measured by the Diabetic Adjustment Scale), lower levels of self-esteem (as measured by the Coopersmith Self-Esteem Inventory) and higher levels of depression (as measured by the Children's Depression Inventory) than will diabetic adolescents diagnosed for longer than 3 years.

# III. Methods

## Subjects

The study sample of 53 diabetic adolescents was obtained from the general population of adolescent members of the Canadian Diabetes Association who resided in a large metropolitan center. All subjects in the study met the following inclusion criteria:

1. Subjects were males and females between the ages of 12 and 17, inclusive;
2. were diagnosed with insulin-dependent diabetes mellitus for at least one year; and
3. were able to read and speak English.

In addition, adolescents with severe physical disabilities or mental disabilities which would interfere with their ability to answer the questionnaires and those adolescents that did not wish to participate, were excluded from the study. There were a total of 70 teens who were eligible to participate and 75% of these teens met the inclusion criteria and participated in the study.

## Data Collection Procedures

Written informed consent was obtained from the subject and his or her legal guardian. Potential subjects were initially contacted by a letter from the Canadian Diabetic Association-Teen Support Group for permission to release that person's name to the Principal Investigator. The Principal Investigator then contacted the parents of

potential subjects and with the parent's permission, requested the adolescent to participate in the study. A home visit was arranged at a mutually convenient time for the purposes of obtaining written consent from the adolescent and parent, and for completion of the questionnaires. The total testing time was about 30 minutes. All subjects were administered the Children's Depression Inventory, the Coopersmith Self-Esteem Inventory and the Diabetic Adjustment Scale.

**Instruments for Data Collection**

Three data collection tools were used and are described as follows:

**The Diabetic Adjustment Scale** (DAS) was developed as a means of assessing the individual's views of insulin-dependent diabetes mellitus, its treatment and its influence on daily functioning (Sullivan, 1979a, 1979b). The Diabetic Adjustment Scale measures adolescents' attitudes to five adjustment areas which were derived from factor analysis of the 68 items in the scale. These adjustment areas comprise attitude toward diabetes and bodily functioning, peer adjustment, school adjustment, dependence-independence issues and family relationships.

Scoring for the Diabetic Adjustment Scale is based on 50 of the total 68 items. Eighteen items obtain direct information and do not assess life adjustment. Scoring on adjustment items is based on a 1 to 5 point system. A total score of 50 points indicates the highest overall adjustment

score, while a total score of 250 points indicates the lowest adjustment score. The following ranges are provided as guidelines for interpretation of the results:

| | |
|---|---|
| good adjustment | 50 - 116 |
| fair adjustment | 117 - 183 |
| poor adjustment | 184 - 250 |

Sullivan (1979a, 1979b) reports clinically meaningful intercorrelations among adjustment areas and significant correlations with measures of self-esteem and depression. Jacobson et al. (1984, 1986) found significant correlations between self-perceptions of esteem and competence with the Diabetic Adjustment Scale, between locus of control and adjustment to diabetes and between intensity of behavioral symptoms and the Diabetic Adjustment Scale total score. These findings lend support for the validity of the Diabetic Adjustment Scale.

Sullivan utilized a team of experts in psychiatry, pediatrics, and endocrinology who rated each response according to their own definitions of what constituted good or poor adjustment. In addition, raters were asked to indicate into which category each item best fit. Items which could not be categorized into adjustment areas or in which it was unclear as to what was good adjustment, were excluded from the total scoring and considered informational items.

**The Children's Depression Inventory** (CDI) is a 27 item paper and pencil, self-report questionnaire designed to assess cognitive, behavioral and neurovegetative signs of

depression in children. The Children's Depression Inventory is essentially a downward extension (in terms of age) of the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) and includes several additional items that attempt to assess areas of school and social-peer relations. The Children's Depression Inventory differs from the Beck Depression Inventory in its phraseology, which is more suited to the language of 8 to 13 year old children (Kovacs & Beck, 1978). Each item on the Children's Depression Inventory consists of three statements that range from mild or limited symptomatology to severe or maladaptive symptomatology. The subject is asked to mark the sentence that best describes the way he or she has been thinking and feeling during the preceding two weeks. Each item is scored 0, 1 or 2, with a score of 2 representing the most severe choice. Total scores on the Children's Depression Inventory range from 0 to 54.

Smucker, Craighead, Craighead and Green (1986) reported acceptable test-retest reliability and internal consistency for the Children's Depression Inventory and presented highly consistent normative data for a large sample of children and adolescents. The distribution and reliability statistics for the sample were consistent with those previously summarized by Kovacs (1985) for a Canadian school sample. The following normative properties of the Children's Depression Inventory are suggested: a mean of approximately 9.00, a standard

deviation of about 7.00 and a cutoff score of 19 for the upper 10% of the distribution.

Reliability studies for the Children's Depression Inventory have produced varying results. Reliability as assessed through co-efficient alpha, item-total score, product-moment correlations and test-retest coefficients proved acceptable; however, gender differences were noted, especially among Grade 7 and Grade 8 females (Smucker et al., 1986). Kovacs (1985) reported a 9 week test-retest reliability of .84, while Saylor, Finch, Spirit, and Bennett (1984) reported a 1 week reliability of .39 for a sample of 69 children in Grade 5 and Grade 6, compared to .87 for a group of 30 emotionally disturbed children tested over the same time interval. Finally, a number of studies have found that clinically depressed and non depressed subjects could be reliably differentiated through using the Children's Depression Inventory (Carey, Greshame, Ruggiro, Faulstich, & Enyart, 1987; Kovacs, 1985; Saylor et al., 1984).

**The Coopersmith Self-Esteem Inventory** (CSEI) is a 58 item scale which measures self-esteem in social, academic, family and personal spheres. Coopersmith (1981) has defined self-esteem as the expression of approval or disapproval, indicating the extent to which a person believes himself competent, successful, significant and worthy. The school form consists of 50 items measuring self-esteem and an 8 item Lie Scale. The school form is designed for children ages 8-15 years and is scored on 5 scales: General Self,

Social Self - Peers, Home-Parents, School-Academic, Total Self and Lie Scales.

A Total Self Score is obtained by summing the number of self-esteem items answered correctly and multiplying the total raw score by two. The maximum total raw score is 100--indicating a totally positive self-esteem. There are no exact criteria identified for high, medium or low levels of self-esteem but general guidelines are provided. For the Coopersmith Self-Esteem Inventory, high scores correspond to high self-esteem. The upper quartile can be considered indicative of high self-esteem, the lower quartile indicative of low self-esteem and the interquartile range generally is indicative of medium self-esteem.

The Coopersmith Self-Esteem Inventory Manual provides several normative populations for comparison purposes as well as a summary of reliability and validity studies conducted from 1970 to 1979 (Coopersmith, 1981). The reliability of the Coopersmith Self-Esteem Inventory at several grade levels was demonstrated by Spatz and Johnson (1973) who administered the School Form to over 600 subjects in Grades 5, 9, and 12. Kuder-Richardson reliability estimates (KR 20's) were calculated for 100 randomly selected subjects from each grade level. Obtained coefficients at all three levels were in excess of .80, indicating adequate internal consistency for students in all three grades.

A study of the Coopersmith Self-Esteem Inventory construct validity was reported by Kokenes (1978) who performed a factor analysis of the responses of 7,600 children in Grade 4 through Grade 8 and discovered that the four bipolar dimensions obtained were highly congruent with the test's subscales. Predictive validity was estimated by correlating subscale scores of the Coopersmith Self-Esteem Inventory through regression analysis (Donaldson, 1974) and indicated that the Coopersmith Self-Esteem Inventory is a fair predictor of reading achievement. Coopersmith Self-Esteem Inventory scores were found to be significantly related to creativity, academic achievement, resistance to group pressures, willingness to express unpopular opinions and perceptual constancy (Coopersmith, 1967).

**Data Analysis**

Pearson Product Moment Correlations were calculated to examine the relationship between diabetic adjustment factors and degree of depression, between self-esteem scores and degree of depression and between adjustment factors and self-esteem scores. Mean scores, standard deviations and t ratios were computed for the Children's Depression Inventory, the Diabetic Adjustment Scale and the Coopersmith Self-Esteem Inventory to assess the effects of gender on adjustment variables. One-way analysis of variance (ANOVA) and multivariate analysis of variance (MANOVA) was used to examine the effect of gender, age at onset of diabetes and length of time since diagnosis on responses to the Diabetic

Adjustment Scale, Children's Depression Inventory and Coopersmith Self-Esteem Inventory. In those instances where a multivariate significant F score was reported, the univariate F scores for subscales were also reported. Finally, the responses to individual questions on each instrument were summarized to report the concerns related to life adjustment that were expressed by at least 25% of the respondents.

**Ethical Considerations**

Ethical guidelines outlined in the University Policy related to Ethics in Human Research (January, 1985) were followed throughout the study. The primary ethical issues involved in the research project were those of informed consent and confidentiality. Subjects were informed of the purpose of the research, the data collection design and the anticipated time commitment. As well, subjects were informed of their right to withdraw from the study at any time, without penalty or changes in their treatment or follow-up regimen. Confidentiality of data was enforced by coding all of the subjects' names. To ensure anonymity, all questionnaires were coded numerically with each adolescent's questionnaires bearing the same number. A list of identifying numbers was retained by the Principal Investigator for purposes of notifying subjects of the study results. Finally, the signed consent forms were separated from the data collection forms and were kept in a locked file.

## IV. Results and Discussion

In this chapter the results obtained from the Diabetic Adjustment Scale (DAS), the Coopersmith Self-Esteem Inventory (CSEI) and the Children's Depression Inventory (CDI) will be presented. Descriptive statistics and content analysis, where appropriate, were used to describe the responses obtained from the participants. Significant findings as well as the limitations of the study will be discussed.

### Characteristics of the Participants

The study sample consisted of 27 female and 26 male subjects with an age range of 13 to 17 years. The mean age of the sample (N=53) was 15.2 years. The mean age at onset of diabetes was 8.5 years and the mean years since diagnosis of diabetes was 6.7 years. Subjects were divided into three groups to facilitate data analysis for effects of onset of diabetes during early childhood and during puberty. The sample was divided into four groups based on quartile ranges to facilitate data analysis for effects of length of time since diagnosis of diabetes.

### Description of the Research Variables

The group mean score for the Children's Depression Inventory was 8.83 with a standard deviation of 6.42. This falls within the normative properties of the instrument

established by Kovacs (1985) and Smucker et al. (1986). The group mean for the total score on the Coopersmith Self-Esteem Inventory was 73.72 with a standard deviation of 17.37, also comparable to the normative properties established for this instrument (Coopersmith, 1981). Finally, the Diabetic Adjustment Scale group mean for the total score was 98.81 with a standard deviation of 19.12. This falls within the range of "good to fair adjustment to diabetes" (Sullivan, 1979a, 1979b). The direction of the scores suggests that as a group there is a lack of pathology, with responses falling in the direction towards a healthy adjustment to diabetes and life in general.

**Data Analysis**

**Correlation between Instruments**

Pearson Correlation Co-efficients were calculated to measure the strength of the relationships between the dependent variables of depression, self-esteem and adjustment to diabetes. The Coopersmith Self-Esteem Inventory and the Diabetic Adjustment Scale total scores were obtained by summing subscale scores. Therefore correlation co-efficients were calculated for the total and subscale scores on each instrument to determine internal correlations. Correlation co-efficients were then calculated

for the total scores and finally, for total and subscale scores for all instruments.

All subscale scores were significantly correlated in the Coopersmith Self-Esteem Inventory. In particular, the general self-esteem subscale correlation accounted for 85% of the variance in the total score. Subscale scores correlated with each other with the exception of social and home subscales. Table 1 summarizes self-esteem correlations.

**Table 1**
**Correlations between Coopersmith Self-Esteem Inventory Subscales (CSEI)**

| | TOTAL | GENERAL | SOCIAL | HOME | SCHOOL |
|---|---|---|---|---|---|
| TOTAL | 1.00 | .92* | .58* | .58* | .74* |
| GENERAL | .92* | 1.00 | .48* | .37* | .60* |
| SOCIAL | .58* | .48* | 1.00 | .14 | .30* |
| HOME | .58* | .37* | .14 | 1.00 | .35* |
| SCHOOL | .74* | .60* | .30* | .35* | 1.00 |

*p = $\leq$.05

Significant correlations exist between all Diabetic Adjustment Scale subscales and the total score. The correlation for the attitude toward diabetes subscale and school adjustment subscale accounted for respectively, 59% and 55% of the variance in the total score. As well, there are significant correlations between all subscale scores. These correlations are presented in Table 2.

**Table 2**
**Correlations between Diabetes Adjustment Subscales (DAS)**

| | TOTAL | DEP/IND | SCHOOL | FAMILY | PEER | ATTITUDE |
|---|---|---|---|---|---|---|
| TOTAL | 1.00* | .69* | .74* | .72* | .65* | .77* |
| DEP/IND | .69* | 1.00* | .34* | .51* | .39* | .36* |
| SCHOOL | .74* | .34* | 1.00* | .39* | .42* | .59* |
| FAMILY | .72* | .51* | .39* | 1.00* | .48* | .29* |
| PEER | .65* | .39* | .42* | .48* | 1.00* | .36* |
| ATTITUDE | .77* | .36* | .58* | .29* | .36* | 1.00* |

***p≤.05**

Correlations were noted between total scores and subscores of the Diabetic Adjustment Scale (DAS) and Children's Depression Inventory (CDI) whereby 55% of the variance in the Children's Depression Inventory could be accounted for by the variance in the Diabetic Adjustment Scale. These correlations are presented in Table 3. The multiple correlation between the Children's Depression Inventory - total score and subtests of the Diabetic Adjustment Scale scores (excluding the total) was 0.77.

**Table 3**
**Correlations between Children's Depression Inventory (CDI) and Diabetic Adjustment Scale (DAS)**

| DAS | TOTAL | DEP/IND | SCHOOL | FAMILY | PEER | ATTITUDE |
|---|---|---|---|---|---|---|
| CDI | .75* | .44* | .68* | .49* | .52* | .58* |

***p≤.05**

As well, the Children's Depression Inventory (CDI) and total and subscores of the Coopersmith Self-Esteem Inventory (CSEI) were significantly correlated in that 67% of the variance in the depression score could be accounted for by

the total subtest of the self-esteem measure. These correlations are presented in Table 4. The multiple correlation between the Children's Depression Inventory-total score and subtest scores of the Coopersmith Self-Esteem Inventory (excluding the total) was 0.83.

**Table 4**
**Correlations between Children's Depression Inventory (CDI) and Coopersmith Self-Esteem Inventory (CSEI)**

| CSEI | TOTAL | GENERAL | SOCIAL | HOME | SCHOOL |
|---|---|---|---|---|---|
| CDI | -.82* | -.76* | -.44* | -.52* | -.64* |

*p=≤.05

Finally, the total score and subscale scores of the Diabetic Adjustment Scale and the Coopersmith Self-Esteem Inventory were significantly correlated with the exception of social self-esteem. These correlations are presented in Table 5. The multiple correlation between the Coopersmith Self-Esteem Inventory (total score) and subtest scores of the Diabetes Adjustment Scale (excluding the total score) was 0.64.

**Table 5**
**Correlations between Coopersmith Self-Esteem Inventory (CSEI) and Diabetic Adjustment Scale (DAS)**

| DAS | TOTAL | DEP/IND | SCHOOL | FAMILY | PEER | ATTITUDE |
|---|---|---|---|---|---|---|
| **CSEI** | | | | | | |
| TOTAL | -.62* | -.39* | -.58* | -.34* | -.31* | -.51* |
| GENERAL | -.57* | -.36* | -.55* | -.24* | -.20 | -.59* |
| SOCIAL | -.16 | -.09 | -.18 | -.02. | - 29* | -.05* |
| HOME | -.52* | -.39* | -.35* | -.58* | -.21 | -.24* |
| SCHOOL | -.44* | -.17* | -.58* | -.18* | -.29* | -.34* |

*p=≤.05

As predicted in the hypotheses, teens who were well adjusted to diabetes demonstrated higher levels of self-esteem and lower levels of depression than did teens who were poorly adjusted to diabetes. The significant intercorrelations among adjustment areas and among self-esteem areas have been noted in previous research. As well, correlations between the research instruments have been reported. Sullivan (1979a, 1979b) described clinically meaningful intercorrelations among adjustment areas and significant correlations with measures of self-esteem and depression. Jacobson et al. (1984, 1986) found significant correlations between self-esteem and diabetes adjustment and between locus of control and adjustment to diabetes.

**Effects of age at onset of Diabetes**

The sample was divided into three groups, specifically those teens under 5 years of age (N=11), teens between 5 to 11 years of age (N=29) and those teens diagnosed during puberty or 12 to 16 years (N=13). Multivariate analysis of variance (MANOVA) was computed for the Coopersmith Self-Esteem Inventory and the Diabetic Adjustment Scale. There were no significant differences between groups for scores related to self-esteem ($F=1.24$, $df=(12,92)$, $p=.27$). As well, no significant group differences were found for diabetes adjustment ($F=.53$, $df=(12,92)$, $p=.89$). One way Analysis of Variance (ANOVA) was computed to test for group differences between mean scores on the Children's Depression Inventory and on total and subscale mean scores for the Coopersmith

Self-Esteem Inventory and Diabetic Adjustment Scale. A summary of mean scores for each age group is presented in Table 6

**Table 6**
**Age at Onset of Diabetes**
**Children's Depression Inventory (CDI),Coopersmith Self-esteem Inventory (CSEI) and Diabetic Adjustment Scale (DAS)**

| | Under 5 yrs Mean(Std Dev) (N=11) | 5-11yrs Mean(Std Dev) (N=29) | 12-16yrs Mean(Std Dev) (N=13) |
|---|---|---|---|
| CDI | 5.82(4.77) | 7.90(5.39) | 13.46(7.64) |
| CSEI | | | |
| TOTAL | 74.18(15.56) | 78.38(15.24) | 62.92(19.61) |
| GENERAL | 39.82(8.08) | 41.03(8.84) | 33.85(13.23) |
| SOCIAL | 13.64(2.50) | 14.62(2.01) | 11.69(4.07) |
| HOME | 11.09(3.94) | 11.17(3.91) | 9.38(5.06) |
| SCHOOL | 9.64(3.88) | 11.38(3.75) | 8.00(3.56) |
| DAS | | | |
| TOTAL | 88.73(14.90) | 92.52(19.37) | 101.00(20.97) |
| DEP/IND | 17.09(4.13) | 17.55(5.17) | 18.08(6.53) |
| SCHOOL | 15.09(3.18) | 15.73(4.49) | 18.92(4.19) |
| FAMILY | 15.91(4.30) | 16.69(5.54) | 17.77(3.22) |
| PEER | 14.27(4.82) | 15.03(3.35) | 16.23(3.49) |
| ATTITUDE | 26.36(4.65) | 27.52(6.69) | 30.08(10.40) |

The Student-Newman-Keuls Procedure was used to determine pairs of groups significantly different at the $p \leq .05$ probability level. Teens with onset of diabetes during puberty had higher levels of depression than teens in the other groups. As well, group differences were noted for total scores and social and school subscale scores on the Coopersmith Self-Esteem Inventory. Teens with onset of diabetes during puberty had significantly lower levels of total self-esteem than teens diagnosed between the ages of 5 to 11 years. There were no group differences on the general

and home subscales. Group differences for mean scores on the Diabetic Adjustment Scale were significant only in the area of school adjustment.

It appears that teens with onset of diabetes during puberty have higher levels of depression than teens with onset of diabetes before puberty. As well, when each dependent variable (total and subscale score) is considered separately using one way Analysis of Variance, the onset of diabetes during puberty has a negative impact on overall self-esteem and in particular, on the areas of school and social self-esteem. Diabetes adjustment in the area of school activities is also adversely affected when the teen develops diabetes during puberty. However when group differences based on all dimensions of the instrument (subscale scores) are considered using Multivariate Analysis of Variance, no significant effects of age at onset of diabetes on self-esteem or adjustment are evidenced. The finding of a nonsignificant multivariate F for self-esteem subscales but a significant univariate F for several of the subscale scores and total score indicates that the univariate results must be interpreted tentatively. This holds true as well for the nonsignificant multivariate F for the diabetic adjustment subscales and the significant univariate F for the school subscale. Therefore the impact of onset of diabetes during puberty can only be considered to affect levels of depression.

These findings do not support the hypothesis that adolescents with onset of diabetes at age 5 years or older would demonstrate higher levels of adjustment to diabetes than would adolescents with onset of diabetes before age 5 years. It appears that the years of puberty may be a time of vulnerability for adolescents in terms of emotional adjustment. The onset of diabetes during puberty may give rise to greater feelings of sadness and depression than would onset of diabetes during earlier childhood. Further research should be directed toward investigating the impact of onset of diabetes during puberty and the effects on self-esteem and adjustment, specifically related to school and peer relationships.

**Effects of Gender on Life Adjustment**

A gender difference was found in responses to the Diabetic Adjustment Scale , specifically the Attitude toward diabetes subscale. Females had significantly higher scores ($t= 3.23$, $df=51$, $p=.00$) than males indicating a more negative attitude towards diabetes. There were no significant differences in mean scores for the Coopersmith Self-Esteem Inventory however marginal gender differences were noted for the general subscore and for Total self-esteem ($t=-1.74$, $df=51$, $p=.09$). Finally, gender differences were also noted for females who had higher levels of depression ($t=1.96$, $df=51$, $p=.05$). Table 7 summarizes the significant Gender t-test results.

**Table 7**
**t-Test for Gender Differences in Children's Depression Inventory (CDI) and Diabetes Adjustment Scale (DAS)**

| | Female Mean (Std Dev) | Male Mean (Std Dev) | t(df) value | probability |
|---|---|---|---|---|
| CDI | 10.48(6.02) | 7.12(6.50) | 1.96(51) | 0.05* |
| DAS | | | | |
| TOTAL | 97.89(19.55) | 89.58(18.06) | 1.61(51) | 0.12 |
| DEP/IND | 18.22(4.83) | 16.92(5.63) | 0.90(51) | 0.37 |
| SCHOOL | 16.44(4.15) | 16.31(4.65) | 0.11(51) | 0.91 |
| FAMILY | 16.70(4.64) | 16.88(5.02) | 0.14(51) | 0.89 |
| PEER | 15.48(4.03) | 14.85(3.40) | 0.62(51) | 0.54 |
| ATTITUDE | 30.35(8.32) | 24.85(4.75) | 3.23(51) | 0.00* |

*P=≤.05

Gender differences in levels of depression have been found in a number of other studies. Carey et al. (1987) identified the three underlying dimensions of depressive affect, oppositional behavior and personal adjustment through factor analysis of the Children's Depression Inventory. Gender differences in the sample of 306 children and adolescents were noted only on the depressive affect factor where girls obtained higher scores than boys. Smucker at al. (1986) reported grade by gender fluctuations in a sample of 1,252 subjects aged 8 to 16 years. Findings related to gender differences indicated that the Children's Depression Inventory scores were significantly more stable for females and that, whereas males tended to externalize depression through acting out behavior, females tended to internalize depression through a dysphoric mood and negative view of self. Finally, Shain, Naylor & Alessi (1990)

administered the Children's Depression Inventory to 45 adolescents and found high concurrent validity in comparing clinician assessments with self-rated depression scores. In particular, the correlations between self-rated and clinician rated scores were higher for girls. It was speculated that boys may show more use of denial or may be less able to express their depressive feelings.

Multivariate analysis of variance (MANOVA) was computed for subscale scores for the Coopersmith Self-Esteem Inventory and the Diabetic Adjustment Scale. There were no significant gender differences noted for scores on the Coopersmith Self-Esteem Inventory. However, significant gender differences were found for the Diabetic Adjustment Scale where females had higher scores on adjustment to diabetes ($F=2.73$, $df=(6,46)$, $p=.02$). This would indicate that females were less well adjusted to diabetes than males. In view of the significant MANOVA F score, subsequent one way ANOVA was computed for each subscale score. A gender difference was noted on the attitude to diabetes subscale ($F=10.23$, $df=(1,51)$, $p=.00$). Table 8 presents the significant results.

**Table 8**
**Gender MANOVA Pillai V criterion F value and ANOVA F Values for the Diabetic Adjustment Scale (DAS)**

| | MANOVA F Value df=(6,46) | probability | ANOVA F Value df=(1,51) | probability |
|---|---|---|---|---|
| **DAS** | 2.73 | .02* | | |
| SUBSCALES | | | | |
| DEP/IND | | | 0.82 | .37 |
| SCHOOL | | | 0.01 | .91 |
| FAMILY | | | 0.02 | .89 |
| PEER | | | 0.38 | .53 |
| ATTITUDE | | | 10.23 | .00* |

*$p \leq .05$

The gender differences noted for this sample do not support the hypothesis that there would be no difference between females and males in adjustment to diabetes. The findings indicate that the degree of adjustment to diabetes appears to be influenced by gender in the area of "attitude" toward diabetes and that females have a poorer attitude to diabetes than males. As well, females demonstrated higher levels of depression than males. Levels of self-esteem could not be considered to be influenced by gender for this sample. It may be the case that with a larger sample size the marginal gender differences noted may have been significant.

**Effects of years since diagnosis of diabetes**

The sample was divided into 4 groups with the following years since diagnosis of diabetes: respectively teens with 1 to 3 years (N=14), 4 to 6 years (N=13), 7 to 9 years (N=13) and 10 to 15 years (N=13) since diagnosis of diabetes. Group divisions were made on the basis of the quartile ranges for

age of subjects. Multivariate analysis of variance (MANOVA) was computed for the Coopersmith Self-Esteem Inventory and the Diabetes Adjustment Scale. There were no significant differences between groups for scores related to self-esteem ($F=1.06$, $df=(18,138)$, $p=.40$). As well, no significant group differences were found for diabetes adjustment ($F=1.45$, $df=(18,138)$, $p=.12$). The years since diagnosis (independent variable) appears to have no relevance to life adjustment for the study group of adolescents with diabetes.

**Questionnaire responses**

The frequencies of responses to questions on the Children's Depression Scale, Coopersmith Self-Esteem Inventory and Diabetic Adjustment Scale were included to illustrate the statements that at least 25% of the adolescents chose to describe their feelings within the two weeks prior to testing. These responses represent levels of depressive symptomatology.

**Children's Depression Inventory**

Teens expressed concerns over homework and school performance, uncertainty about the future, anxiety about somatic symptoms, body image concerns, loss of appetite, difficulty sleeping, fatigue and feelings of loneliness. There was a higher frequency of females who expressed concerns related to worrying about daily events (things bother me many times), worrying about aches and pains and loss of appetite. Of the sample, 62% evidenced no or minimal depression, 21% described feelings of sadness and 2% scored

within the range indicating clinical depression. There were 7 females and 2 males in this latter group, with the majority aged 16 to 17 years.

These findings are consistent with other research on depression in adolescence. The prevalence of depression in the normal population of adolescents has ranged from 1.9% to 8% (Earls, 1984; Kashani & Symmonds, 1979; Pfeffer, 1985). Symptoms of sadness have been found in 17% of the adolescents studied by Kashani and Symmonds (1979) and Pfeffer (1985). Close et al. (1986) noted depression in 12% of poorly-adjusted adolescents with diabetes. To conclude, the study sample appears to be similar to non-diabetic adolescents in terms of prevalence of depression. Table 9 summarizes the most frequent responses to the Children's Depression Inventory which indicate some degree of depression.

**Table 9**
**Frequency of Responses to questions on the Children's Depression Inventory**

| Frequency | Question |
|---|---|
| 53% | I have to push myself many times / all the time to do my homework. |
| 51% | I am not sure if things will work out for me / Nothing will ever work for me. |
| 45% | Things bother me many times / all the time. |
| 40% | I worry about aches and pains many times. |
| 38% | My schoolwork is not as good as before / I do badly in subjects I used to be good in. |
| 38% | There are some bad things about my looks. |

| | |
|---|---|
| 36% | I think about killing myself but I would not do it. |
| 36% | I do not do what I am told most times / I never do what I am told. |
| 34% | I worry that bad things will happen to me. |
| 32% | Many bad things are my fault / All bad things are my fault. |
| 30% | Many days / most days I do not feel like eating. |
| 30% | I am tired many days / I am tired all the time. |
| 30% | I can be as good as other kids if I want to / I can never be as good as other kids. |
| 28% | I have fun at school only once in a while / I never have fun at school. |
| 26% | I have trouble sleeping many nights. |
| 25% | I have fun in some things / Nothing is fun at all. |
| 25% | I feel alone many times / all the time. |
| 25% | I have some friends but wish I had more / I do not have any friends. |

**Coopersmith Self-Esteem Inventory**

Teens expressed concerns in three areas: school performance, parent-teen relationships and general self depreciation or uncertainty. Peer relationships were not identified as contributing to low self-esteem. School issues were related to not doing as well in school as desired, not feeling proud of school work and anxiety about being called on in class or talking in front of the class. Relationships with parents were identified as being conflictual for 25% to 55% of the teens. Parents were described as expecting too much, pushing teens to achieve, not understanding and not

usually considering the teens feelings. Getting upset easily at home and wanting to leave home were statements selected by approximately 40% of the adolescents studied. Finally, general self uncertainty was expressed in statements such as: It's tough to be me, wanting to change things about myself, getting upset easily, feeling sorry for the things I do, things bother me, day dreaming, feeling mixed up and having difficulty making up my mind. Table 10 summarizes the most frequent responses to questions on the Coopersmith Self-esteem Inventory.

**Table 10**
**Frequency of Responses to Questions on the Coopersmith Self-Esteem Inventory**

| Frequency | Question |
|---|---|
| 55% | I'm not doing as well in school as I'd like to. |
| 49% | I get upset easily at home. |
| 49% | It's pretty tough to be me. |
| 49% | There are lots of thing about myself I'd change if I could. |
| 47% | (Not like me) I like to be called on in class. |
| 42% | I get upset easily when I'm scolded. |
| 40% | I'm often sorry for the things I do. |
| 40% | (Not like me) Things don't usually bother me. |
| 38% | There are many times when I'd like to leave home. |
| 38% | (Not like me) My parents and I have a lot of fun together. |
| 38% | My parents expect too much of me. |

34% I find it hard to talk in front of the class.

34% I usually feel as if my parents are pushing me.

32% (Not like me) My parents understand me.

32% I spend a lot of time day dreaming.

32% (Not like me) I'm proud of my school work.

28% Things are all mixed up in my life.

26% (Not like me) I can make up my mind without too much trouble.

26% (Not like me) My parents usually consider my feelings.

25% (Not like me) Kids usually follow my ideas.

There were no significant gender differences in the responses of males and females to the questions. Quartile ranges were established for the total score to facilitate interpretation of test results and comparison with other groups:

| | | |
|---|---|---|
| lower quartile | (low self-esteem) | 48 |
| interquartile | (moderate self-esteem) | 74 |
| upper quartile | (high self-esteem) | 98 |

Teens with scores below 48 were considered to have low self-esteem and represented 6% of the total sample. Teens with scores above 98 were considered to have high self-esteem and represented 6% of the total sample. Those teens with scores in the interquartile range were considered to have moderate or adequate self-esteem and represented 89% of the total sample. The distribution of scores in the interquartile range was skewed compared to the normal distribution curve, with 39% of teens scoring in the lower interquartile range (25% to 50%) and 50% of teens scoring in the upper

interquartile range (50% to 75%). Normative scores for adolescent diabetics have not been established, therefore comparison with other research studies was not possible. However, as a group these adolescents scored well within norms established for children and adolescents in the public school systems. To conclude, as a group these adolescents with diabetes demonstrated adequate to high levels of self-esteem and gender differences in responses to questions were not apparent.

**Diabetes Adjustment Scale**

There was less consistency in the frequency of responses to questions on the Diabetic Adjustment Scale. Only 7 of the 58 questions were identified by over 25% of the respondents as being areas of concern. Three of these questions were not considered to assess adjustment to diabetes and provided information only. There were four areas of adjustment represented by the remaining questions: dependence/independence issues, family and school adjustment and attitude toward diabetes. Heightened concern by parents and in particular the mother over management of the diabetic regimen was identified by 40% of the teens who chose the response "my mother is too protective or careful of me" and by 32% of teens who chose the response "I think my parents are more concerned about my diabetes than about me." Teens identified their teacher's lack of knowledge about diabetes as a concern related to school adjustment. Finally, 30% of the teens responded "I'm afraid I'll get very sick before

I'm very old." Table 11 summarizes the most frequent responses to questions on the Diabetic Adjustment Scale.

**Table 11**
**Frequency of Responses to Questions on the Diabetic Adjustment Scale**

| Frequency | Question |
|---|---|
| 55% | I wish I didn't have diabetes. (always/most of the time) |
| 40% | My mother is too careful or protective of me. (always/most of the time) |
| 32% | I think my parents are more concerned about my diabetes than about me. (always/most of the time) |
| 30% | I'm afraid I'll get very sick before I'm very old. (always/most of the time) |
| 28% | When I'm mad I eat more than usual. (always/most of the time) |
| 26% | I think diabetes is a serious illness. (always/most of the time) |
| 26% | I wish my teachers knew more about diabetes. (always/most of the time) |
| 25% | I think I would enjoy school more if I didn't have diabetes. (always/most of the time) |

Sullivan (1979 a, 1979 b) noted that further validation studies need to be completed before the range of scores for good, fair and poor adjustment to diabetes could be formally utilized. The scores for teens in this present study ranged from 50-139 points. Only 7 teens or 13% of the total group scored in the "fair adjustment" category while 87% scored in the "good adjustment" category. Although a number of teens

had other scores in the areas of depression and low self-esteem, they did not present as poorly adjusted to diabetes.

**Summary**

As a group, the mean scores for adolescents on measures of depression, self-esteem and adjustment to diabetes were within established norms. Overall, the teens demonstrated a healthy self-esteem and adjustment to diabetes. The personality traits of self-esteem, depression and adjustment to diabetes as measured by the instruments were highly correlated.

Quartile ranges were established for the Diabetic Adjustment Scale scores and utilized to divide the group as to level of adjustment. Those teens who were well adjusted to diabetes had higher levels of self-esteem and lower levels of depression than those teens who were poorly adjusted to diabetes. This is consistent with the research findings of Sullivan (1979a, 1979b) and Jacobson et al. (1984, 1986). However, none of the adolescents tested within the range of poor adjustment as established by Sullivan. This may in part be due to a difference in study design. The current study has extended the findings of previous research by including both male and female subjects, by recruiting subjects from a general membership list rather than from a diabetic summer camp roster or out-patient diabetic clinic, and by administering the questionnaires in the adolescent's home rather than in a potentially unfamiliar or uncomfortable environment. These factors may have influenced

the responses of subjects by reducing anxiety, or it may be the case that a different population has been studied.

The independent variables of gender and age at onset of diabetes had an impact on levels of depression. Teens with onset of diabetes during puberty had higher levels of depression than teens with onset of diabetes before puberty. Females demonstrated higher levels of depression than males and were not as well-adjusted to diabetes than males. There were no differences in scores when the years since diagnosis of diabetes were considered.

Further analysis of possible gender and age at onset interaction effects was not feasible due to the small sample size. It would have been interesting to determine if female adolescents with onset of diabetes during puberty were at particular risk for difficulties with life adjustment. Previous research has identified age and gender interaction effects for females with early onset of diabetes. Impaired visual motor skills, lower intellectual functioning and memory and attention deficits have been attributed to possible neurologic dysfunction resulting from both early onset of diabetes and the higher frequency of hypoglycemic convulsions reported for girls with onset of diabetes before age 5 years (Rovet et al., 1987; Ryan et al., 1985). Conversely , gender and age at onset interaction effects on adolescent self-concept have been attributed to the development of different gender specific strategies for coping with the psychological problems and treatment demands

associated with insulin-dependent diabetes mellitus (Ryan & Morrow, 1986). To date there have not been any research studies which have focused on the subset of females with onset of diabetes during puberty and life adjustment variables.

**Limitations of the Study**

There are several limitations of this study that restrict the generalizability of the results. The subjects were not randomly selected and may not have been truly representative of the overall population of adolescents with diabetes. All subjects were members of the Canadian Diabetes Association and consequently, some bias may exist in the results. For example, teens who are highly motivated or who enjoy the peer support that is offered through the Canadian Diabetes Association may have higher levels of self-esteem and adjustment to diabetes than those teens who do not obtain Canadian Diabetes Association membership.

Although the sample consisted of 75% of the available Youth Group members of the Canadian Diabetes Association, the sample size was relatively small. Given a larger sample size some of the marginal differences noted in the present study may have been significant. As well, additional statistical analysis such as multiple regression analysis may have found significant interaction effects for the variables of interest. The structured format of the data collection instruments may have omitted salient aspects of self-esteem, levels of depression or adjustment to diabetes

of the adolescent with diabetes. Finally, the multiple variables which affect the adolescent's response to diabetes cannot be completely controlled for, completely identified nor ordered in magnitude.

Causality between depression, self-esteem and adjustment cannot be inferred as adolescent growth and development may be implicated in these changes. Furthermore it is not possible to determine whether changes in self-esteem or depression occurred prior to or because of diabetes mellitus onset. Finally the study findings cannot be generalized to nonadolescent diabetics nor to non-insulin-dependent diabetics.

These limitations do not detract from the importance of the valuable information that was obtained in this study. The research has demonstrated the adequate life adjustment of this group of adolescents with insulin-dependent diabetes mellitus in relation to self-rated levels of depression, self-esteem and adjustment to diabetes. As well the potential has been identified for a more difficult life adjustment in females and in teens diagnosed during puberty. Finally the utility of self-rated scales is noted as a relatively quick, easy and efficient method of highlighting areas of school, peer and family relationships for further exploration and intervention by nurses in their teaching and provision of care to adolescents.

## V. Conclusions and Recommendations

The main purpose of this study was to explore the relationship between self-esteem, depression and adjustment to diabetes in adolescents with insulin-dependent diabetes mellitus. The hypotheses in the study were based on the assumption that life adjustment to diabetes may be affected by gender, age of the adolescent at onset of diabetes and the number of years since diagnosis of diabetes. As a group, the adolescents demonstrated a healthy adjustment to diabetes and to life in general. The subjects appeared to be similar to non-diabetic adolescents in terms of prevalence of depression and levels of self-esteem. As predicted, measures of self-esteem, depression and diabetic adjustment were significantly correlated. Adolescents who were well adjusted to diabetes had higher levels of self-esteem and lower levels of depression than adolescents who were poorly adjusted to diabetes.

### Implications for Nursing Practise

There were several findings in the study that have implications for nursing practise and research. Female adolescents experienced more feelings of sadness and depression and expressed a more negative attitude toward diabetes than males. This may be related to a different coping response whereby females may internalize depression through a dysphoric mood and negative view of self (Smucker et al, 1986). Males on the other hand may externalize depression through acting out behavior, may show more use of

denial or may be less able or willing to express their depressive feelings (Shain, Naylor & Alessi, 1990).

The second finding is that adolescents diagnosed during puberty have more feelings of sadness or depression than adolescents diagnosed during childhood. This may be related to the cognitive, hormonal and physical transformations associated with puberty and the impact of diagnosis of a chronic illness at a time of increased stress and profound change (Ludvigsson, 1977; Sullivan, 1979a, 1979b). However, there were no significant group differences related to length of time since diagnosis of diabetes. This would support recent research findings that children and adolescents adjust rather quickly to the initial trauma of diagnosis of diabetes (Jacobson et al., 1986; Kovacs et al., 1986). Therefore the findings of higher levels of depression in teens with onset of diabetes during puberty does not appear to be the consequence of a traumatic initial adjustment. Further research with a focus on interaction effects between age at onset of diabetes and gender is warranted.

Finally, the common concerns of adolescents with diabetes were identified in the study. A review of questionnaire responses indicated that school performance, parent-teen relationships, body image, somatic symptoms (fatigue, loss of appetite and difficulty sleeping) and uncertainty about the future were areas of concern for most adolescents. It is important for nurses to recognize that,

despite external appearances of composure or acceptable scores on life adjustment measures, many teenagers experience difficulty in integrating comfortably the demands of diabetes management with the normal adolescent drive for autonomy, independence and acceptance by peers. The use of the study questionnaires as a general survey tool may be a valuable adjunct to ongoing counselling of adolescents with diabetes. Questionnaire answers can assist the nurse to focus on issues most problematic for the individual teen and to make referrals for further therapeutic intervention when warranted.

Data obtained in this study have implications for the practise of nurses involved in diabetes education, public health, acute care units and out-patient clinics. The community health nurse could enhance adjustment to diabetes both indirectly by educating teachers about diabetes management and directly by counselling adolescents referred through the school system. Teens have indicated that they wish teachers knew more about diabetes. The community health nurse could educate teachers about the diabetic treatment regimen and certain aspects of diabetes management that may impact on classroom routines and school activities. This guidance would relate to such issues as participation in physical education sessions, frequency in leaving class to use the bathroom facilities, storage of emergency glucose supplies, quick response to physical illness symptoms and being sensitive to the adolescent's fear of being

"different" from peers. Nurses can provide ongoing support, encouragement and counselling for adolescents with diabetes in the areas of normal growth and development, in managing the treatment regimen, in reducing stress and enhancing coping skills at each entry into the health care system. Nurses who care for adolescents can use a variety of techniques to build self-esteem and enhance coping skills. These may include the acceptance of the adolescent's feelings as real and supporting the teen in expressing feelings more openly; seeking to establish what coping procedures are usually employed and teaching the adolescent alternate coping strategies thereby broadening the options open to him or her in confronting problems. Nurses can encourage adolescents to take an active and mature role in their medical care and foster honest, open, non-judgmental relationships that meets the adolescent's needs for a sense of control and independence. Finally, by promoting parent education and cooperation in developing coping strengths, the nurse can enable parents to provide their child with support to deal with problems. The nurse can foster realistic parental expectations regarding self-care and provide anticipatory guidance regarding adolescent growth and development and the possible impact of managing diabetes at different stages of adolescence.

Peer interactions and peer group approval are of primary importance to most teenagers and enhance their development of identity and autonomy. Peer groups composed

of diabetic adolescents may provide the opportunity for teens to talk openly about their illness without fear of rejection. Additionally, group discussion about various issues such as sexuality, separation from the family, marriage and occupational training may help adolescents reduce their anxieties and deal more effectively with fears about the future. Finally, learning about and associating with others who are successful in dealing with similar problems can effectively enhance life adjustment, help the adolescent accept his or her illness and have a more realistic understanding of diabetes. One important source of peer support is available through the Youth Group of the Canadian Diabetes Association. However, this support may be not be utilized effectively. An important area for further work is to identify the needs of adolescent members and develop related peer group programs to meet those needs.

**Recommendations for Further Nursing Research**

Further research involving the study group of adolescents with diabetes should focus on obtaining information about coping behaviors that may influence life adjustment. As well, measures of glycemic control and compliance with the diabetic regimen should be utilized in the research design. A focus on possible gender differences and the effects of onset of diabetes during puberty on coping behaviors, compliance and adjustment factors is warranted. Finally, a longitudinal approach whereby adolescents are studied from onset of puberty to early

adulthood may demonstrate the effects of cognitive, emotional and physical maturation on the life adjustment of adolescents with diabetes.

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## APPENDIX A

### Letter of Introduction to Potential Subjects

Dear

My name is **Anne Carten.** I am a Registered Nurse completing the Master's Degree Program at the Faculty of Nursing at the University of Alberta and am working at Lion's Gate Hospital. I am interested in studying how teenagers with diabetes manage their lives and how they adjust to diabetes.

Please consider participating in this research study that is titled **"LIFE ADJUSTMENT IN ADOLESCENTS WITH DIABETES".** Participation in the study involves a visit to your home where I will give you three questionnaires to fill out. It should take about 1/2 hour to complete them. I think you will find the questions quite interesting and easy to answer with a yes/no. Other teens who have filled out the questionnaires have enjoyed the chance to express their opinions.

This research project is approved by the Ethics Committee of the University of Alberta and will be carried out under the guidance of the Faculty of Nursing advisors. As well, the Lions Gate Hospital Ethics Committee has approved this project.

Your answers to the questionnaires will be kept strictly confidential. You will never be identified in any published or unpublished materials. You don't have to answer any questions that you don't want to answer, and you can withdraw from the study at any time without penalty.

I would be happy to answer any questions that you might have. If you would consider participating in this study, please contact me at home **(688-0307)** or work **(988-3131 local 290)**. Please call Leslie Dunnigan at 599-0364 if you do not wish me to contact you further about the study.

Thank you for your help.

Sincerely,
Anne Carten RN, BScN.

**APPENDIX B**

**University of Alberta, Faculty of Nursing**
**Informed Consent Form (TEEN)**

Project Title: Life Adjustment of Adolescents with Diabetes

Investigator: Anne E. Carten, RN, BScN
Graduate Office, Faculty of Nursing,
Clinical Sciences Building
University of Alberta

Home phone: (604) 688-0307 Vancouver

Purpose of the Study: The purpose of this study is to learn more about how teens with diabetes manage their lives. The results of this study may help nurses understand the ways that teens handle diabetes and may show things that nurses can do to help teens adjust to diabetes.

Consent: This is to certify that I,_____ agree to participate in the study outlined above. I understand that I have given permission for Anne Carten to give me three questionnaires to fill out. I also understand that:

1. The average length of time to complete the questionnaires will be about 30 minutes.
2. I will not have to answer any questions that I do not wish to answer.
3. The information obtained through questionnaire answers will be kept in strict confidence and that there will be no information that will identify me or my family in any published reports of the study.
4. I am free to end the visit at any time and to withdraw from the study at any time without penalty.

Questions about the study have been encouraged and my questions have been answered to my satisfaction.

Date:_____ Signature:_____

Investigator:_____

## APPENDIX C

### University of Alberta, Faculty of Nursing
### Informed Consent Form (ADULT)

Project Title: Life Adjustment of Adolescents with Diabetes

Investigator: Anne E. Carten, RN, BScN
Graduate Office, Faculty of Nursing,
Clinical Sciences Building
University of Alberta

Home phone: (604) 688-0307 Vancouver

Purpose of the Study: The purpose of this study is to explore with teens how they have adjusted to the demands of living with diabetes. It is anticipated that the results of the study will provide nurses with a better understanding of the ways in which teenagers with diabetes adapt their daily activities of living, and identify opportunities that health care professionals can utilize to help teenagers adjust to diabetes.

Consent: This is to certify that I give my consent for my teenager to participate in the study outlined above. I understand that I have given permission for Anne Carten to give three questionnaires to my teenager to fill out. I also understand that:

1. The average length of time to complete the questionnaires will be about 30 minutes.
2. My teenager will not have to answer any questions that he/she does not want to answer.
3. The information obtained through questionnaire answers will be kept in strict confidence and that there will be no information that will identify my family in any published reports of the study.
4. My teenager will be free to end the visit at any time and to withdraw from the study at any time without penalty.

Questions about the study have been encouraged and my questions have been answered to my satisfaction.

Date:_____ Signature:_____
Investigator:_____